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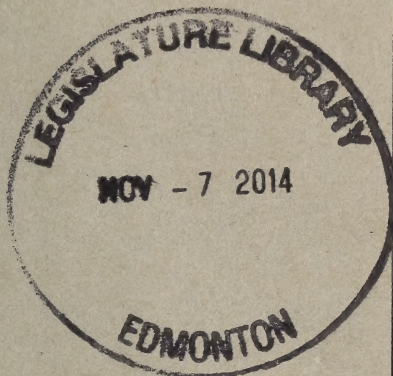
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Grazing Rates Report

SHORT GRASS AREA OF ALBERTA



Compiled with the co-operation of the
Short Grass Stock Growers' Association

BY

C. Graham Anderson

GRAZING APPRAISER

Department of Land and Mines

PROVINCE OF ALBERTA

1941

A. Shnitka, King's Printer
EDMONTON:

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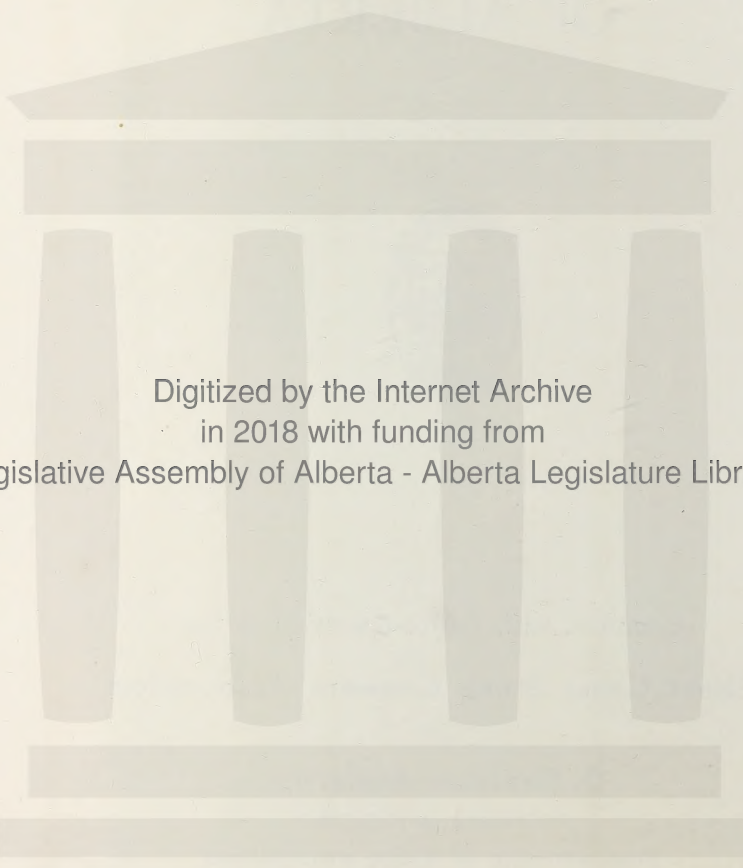
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Dedication

IN the preparation of this Report on grazing rates for the Department of Lands and Mines, made at the request of the Short Grass Stock Growers' Association, of Medicine Hat, Alberta, the appraiser desires to pay tribute to the late Albert Helmer who, at the time of his death, was Supervisor of Grazing for the Province of Alberta.

As his assistant, when he held a similar position with the Dominion Government, Department of the Interior, it was the appraiser's privilege to receive training in grazing matters and become conversant with the industry's many problems under his kindly counsel and tutelage.

Albert Helmer was one of the rare old-timers of the West. Born in Carleton County, Ontario, during the early sixties, of Irish and Pennsylvania Dutch origin, he was endowed with the wit of the Irish and the patience of the Dutch pioneers.

A keen student, as a young man, he made the fullest use of the public library in Carleton County, one of Canada's first public libraries. The West called him and in the early eighties he was a surveyor on the Fourth Meridian Survey, the present boundary between Saskatchewan and Alberta. The United States felt his touch for, as a surveyor, he ran the "grade" for the first line of railway into Tulsa, Oklahoma. Later he served as a watermaster with the Riverside Water Company in California.

The Dominion Government called him to organize the Dominion forest reserves on the eastern slopes of the Rocky Mountains, the foundation of Canada's present vast system of forests and national parks; therefore he might be called one of Canada's first conservationists. Consequently, the irrigationists of today, we who use hydro electric power on the prairies, and the stockmen alike, owe Albert Helmer a debt of gratitude.

He pioneered one of the first small irrigation schemes in the short grass area; and many a stockman in Saskatchewan, Alberta and British Columbia is in business today because of Albert Helmer's foresight and understanding of their problems.

He was privileged to live past his allotted span of "three score years and ten"; to be endowed with the sagacity of age and the enthusiasm of youth; to love the fields and forests. But above all, his love and understanding of his fellow men,

with the desire to serve, made him a rich man. Of material wealth he had little, but countless friends were his throughout Western Canada. It was fitting that his passing should be among the giant redwoods of Northern California that he loved so well, after having travelled by every form of transportation in his lifetime, from ox-cart to airplane in the West.

It is also fitting that this Report, which the appraiser trusts will be of service to the range industry of Alberta, should be dedicated to the memory of this grand old-timer of the West, to whom the stockmen meant so much.

C. GRAHAM ANDERSON,
Grazing Appraiser.

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PART I

PREFACE

A large number of the stockmen of south-eastern Alberta had felt, over a considerable period of time, that due to their specific conditions in that part of the Province, known as the short grass plains, that an association to deal with some of these problems was a necessity. The formation of the Short Grass Stock Growers' Association was the outcome of such necessity.

Due to a combination of many factors over which they had no control these ranchers found themselves in a serious situation, which threatened their very existence, and the future of the industry, in this part of the Province. This combination of factors consisted of a prolonged drought period, in which there had been small grass growth, a low market price for several years and resultant over-grazing in an effort to pay out on their operations. An accumulation of arrears of rental and taxes to different Government departments had been the result of these factors. It might be added that in the spring of 1938, in the south-eastern part of the Province, there occurred a very disastrous blizzard, piling snow in huge drifts, with a resultant loss to the stockmen of as high as twenty per cent of their herds and flocks.

The Association consequently felt, in view of all these reasons, that the flat rental per acre by the Government could not possibly take all these factors into account; especially the wide fluctuations which occur in live stock market prices, which are the controlling factor in the stockman's ability to pay.

Therefore, at the Annual Meeting of the Association at Medicine Hat on May 26th, 1938, the following resolution was passed to deal with the matter, suggesting that the rates be based upon the productive value of the various range areas:—

Whereas the cost of grass to leaseholders as charged by the Provincial Government in rent and taxes heretofore has not been based on the productive values of various range areas;

And whereas this cost for the past five (5) years has been excessive and beyond the earning capacity of the grass or the leaseholder to pay;

Now therefore be it resolved that this Association request further consideration by the Provincial Government with a view to rating the grazing land according to its earning capacity in relation to live stock values, based upon investigations and surveys already conducted in the short grass area.

Fifty-four members of the Association, holding some 1,045,000 acres of land under lease from the Provincial Government, further supported the resolution by signing the following proposal which was presented to the Honourable N. E. Tanner, Minister of Lands and Mines, for the Province of Alberta:—

Conditions prove conclusively that it is necessary to rehabilitate the range lands of Alberta and in order to accomplish this I am agreeable to enter into an agreement with the Government of Alberta to graze my lands under the joint direction of a joint committee to operate on the information now proven by the Dominion Experimental Station at Manyberries, Alberta, and to base the charge for the range on relation of production to the value of the product raised.

It must be pointed out that under this the Association was not asking or advocating anything of a compulsory nature, such as asking the Government to step in and try to tell the rancher how to run his business.

The proposal rather was an invitation to the Government, as the trustee of these public lands, to assist the user of such lands, namely the leaseholder, in their rehabilitation, and in the preservation of the greatest natural resource of these areas for this and future generations, namely the natural grass cover.

The Association received a very sympathetic hearing from Mr. Tanner upon their proposal at a series of interviews with him dealing with the question, the Minister agreeing to appoint a representative of the Department of Lands and Mines to work with the Special Committee appointed by the Association; and investigate the feasibility of such proposals, together with other relative information regarding the ranching industry, and if such were found to be feasible that the plan go into operation if at all possible in 1940.

At the earliest possible moment, the Minister, on the 15th of July, 1939, appointed the writer, then inspector with the Department of Municipal Affairs at Brooks, to act as the Government's Grazing Representative, to work with the Special Committee of the Association, the appointment being largely due to the writer's previous experience in grazing matters, some years ago, as Assistant Supervisor of Grazing, Dominion Department of the Interior.

The Association's Special Committee consists of Mr. George G. Ross, Aden, Alberta, President of the Association, who has been responsible very largely for the idea set forth by the Association; assisted by Mr. R. P. Gilchrist, of Wild Horse, and Mr. P. A. Minor, of Medicine Hat. This committee, with the addition of the Appraiser, making up the Small Committee to study these problems, while the Large Committee would be composed of the Small Committee, with the addition of the Minister, and Mr. John Harvie, the Deputy Minister.

A meeting of the Large Committee was held on July 21st, 1939, in the Palliser Hotel, Calgary, all members being present, with the exception of Mr. Minor who was unable to be present on that occasion. This meeting was agreed that the Committee should proceed with such investigation, along the lines previously discussed with the Minister by the Association taking into consideration five (5) main factors in such survey, these factors consisting of Capital Investment; Depreciation; Amortization of the Lease; Insurance (Reserve Feed) and Running Expenses of the ranch annually.

It was agreed that the investigation should be as comprehensive of conditions as possible, with a view to presenting the entire picture of the problems confronting the industry, as time would permit, and determining if the Association's proposal, or a similar idea, should prove to be a practical one. Should this appear to be so, then the endeavour would be to have such report worked out in order that the scheme could be put into operation for 1940 for all ranches wishing to co-operate within the area, and spread over as wide an area as possible to give a broader picture. The basis suggested represented the average gain on grass, as determined by the experiments of the Dominion Experimental Station, Manyberries, Alberta, at 250 lbs. per animal, taking into consideration the carrying capacity of the ranch, multiplied by the average price of cattle on the Calgary Livestock Market, less a reasonable freight allowance, as the majority of the ranchers sold their stock f.o.b. ranch or shipping point. A basis of this nature would represent the value of the grass annually.

The above formula would be number of head \times 250 pounds gain \times average price which would equal total value of the grass. In other words, the gross total value of such grass per annum—of which the Government is the trustee, with the cow as the conversion factor, and the rancher the owner of such factor and lessee of the raw material for conversion from the trustee—would be in dollar value of pounds of beef produced.

The matter of the percentage of this gross to which the Government was entitled was left in abeyance until it could be determined as to the percentage of the gross income the ranchers had been paying to the Government in rental and taxes in the past. The Association had presented the figure of 10 per cent as the maximum in their proposals to the Government in putting the matter before the members of their Association at their Annual Meeting.

The conversion factor for sheep and horses, in relation to the carrying capacity as worked out for cattle, was left to be determined by the investigation, assisted by the experience gained both in Alberta and in other parts of the continent.

The Association representatives assured the Appraiser of every co-operation in securing the necessary data from the different members of the Association, as well as any information which they might have which would be of assistance in the matter. It was also suggested that the Appraiser, accompanied by one of the Association's Special Committee if possible, should visit the Province of Saskatchewan and the States of Montana, Wyoming, together with any other localities where somewhat similar conditions in the ranching industry were present.

The Small Committee met later in Medicine Hat on August 4th, 1939, when the Appraiser outlined in skeleton form how he proposed to report on the investigation. He asked that the Committee or a member of it accompany him whenever possible in appraising the different ranches and interviewing the individuals in question. It was pointed out that the members could be assured of the information collected being treated confidentially for the purpose of which each ranch would be given a number.

It appeared that in order to recommend any changes for the betterment of the industry it would be necessary to review some of the factors and conditions which had led up to the present situation, with a view to avoiding in the future some of the mistakes of the past.

The Committee then defined the period of amortization of the leases as 20 years, or 5 per cent per annum, with three per cent as a fair return on the capital investment. It was felt that 20 years was the most reasonable period of time to assure a stockman of that security of tenure so necessary to an industry with a long cycle, and which may be described as a lifetime occupation in order to be successful. A return of 3 per cent was considered fair by the Committee on the capital investment when the other factors suggested by the Association, as entering into the cost of production, were considered as equivalent to bond investments, some of the hazards of the business being taken into account.

The Committee defined "carrying capacity" as the number of cattle which could be grazed in good commercial condition upon the range and preserve the grass, with a reasonable carry-over from year to year.

The Committee felt that the average price, as determined by the Dominion Bureau of Economics for the Calgary market from July 1st to December 31st, the period of most ranch marketings, was on a reasonable basis. It was also decided, for the purpose of this investigation, to take into consideration the average price of the sales of stock through the community auction sales, as the majority so marketed were ranch livestock.

It was decided that Mr. George G. Ross would accompany the Appraiser in the investigation trip to Montana and Wyoming, when such could be conveniently arranged.

The Association members also pointed out to the Appraiser the necessity of considering the present grazing regulations with a view to giving the rancher greater security of tenure in the case of lease terms, and suggested that the regulations of other Provinces and States should be studied with a view to recommending further improvements in them.

Twenty ranches scattered over the south-east portion of the Province had been selected by the Association as being representative of the area to be investigated by the Special Committee. These consisted mainly of cattle ranches, large and small, with some sheep ranches and one horse ranch.

METHOD OF INVESTIGATION

The Appraiser, as the Government Representative, before starting on the more detailed phase of the investigation, made a general survey of range and grass conditions over the major portion of the south-eastern part of the Province, in order to get the larger picture of conditions generally, and for matters of more accurate comparisons with regard to carrying capacities than would have been possible otherwise.

The Dominion Range Experiment Station, Manyberries, Alberta, was visited, and through the courtesy of the Superintendent, Mr. H. J. Hargrave, the work of the Station and the results of many range experiments of many kinds, were viewed and discussed, as well as much data on their files being secured for reference purposes.

Saskatchewan

The Appraiser visited several of the P.F.R.A. Projects in the Province of Saskatchewan and conferred with P.F.R.A. and provincial Government officials in the City of Regina re rates and methods.

He inspected the 138,000 acre Matador Ranch Community Pasture, operated by the Saskatchewan Provincial Government on the Saskatchewan River, north of Swift Current, near Saskatchewan Landing.

The Dominion Government Experimental Station at Swift Current was visited and the Appraiser conferred with Mr. L. B. Thomson, Superintendent, and Dr. S. E. Clarks, Agrostologist, from whom much valuable information was secured on the subject in question.

The ranch of Mr. Olaf Olafson of the Saskatchewan Stock Growers' Association at Old Wives, Saskatchewan, was visited. Mr. Olafson was unfortunately absent at the time but his views on grazing rates in Saskatchewan, from the stockmen's point of view, were expressed by letter at a later date.

The range in south-western Saskatchewan was checked in a general way for matters of comparison with conditions in south-eastern Alberta.

United States of America

In November, 1939, the Appraiser, accompanied by Mr. George G. Ross, President of the Short Grass Stock Growers' Association, of Medicine Hat, went to Montana for the purpose of checking methods, regulations and range conditions in that State, and the United States Forest Service method of rates, which take the price factor into consideration.

It was originally intended that Mr. Ross should be present throughout the entire trip to Montana, Wyoming and Colorado, but through pressure of personal business he was forced to return to Alberta from Billings, Montana, while the Appraiser continued on to Wyoming and Colorado.

U.S.F.S.—Montana

The United States Forest Service officials at Great Falls, Billings and Missoula, Montana, were interviewed upon rates and grazing methods.

At Missoula, Mr. E. V. Sandvig, in charge of Grazing Region No. 1, embracing parts of adjoining States as well as all National Forests in the State of Montana, was of great assistance in securing the necessary information on rates and conditions there.

Through the courtesy of Mr. R. V. Ferguson, Forest Supervisor at Great Falls, the Appraiser was able to see the ranch and interview Mr. Howell Harris of Highwood, Montana, and check his methods of operations, for a comparison, Mr. Harris running some 1200 head of Hereford cattle on his range.

Wyoming

Senator William H. Cross, of Douglas, Wyoming, was contacted, and his ranch operations of some 2500 head of short-horn cattle were checked over. Through his courtesy, Mr. J. B. Griffiths, State Commissioner of Lands for Wyoming at Cheyenne, was interviewed and valuable information as to leases and operations of State lands was secured. Also, the Wyoming Stock Growers' Association was contacted and valuable information secured from this organization.

At Cheyenne, Mr. H. S. Price of the Grazing Division, United States Department of the Interior, was interviewed on the operation of the Taylor Grazing Act in the State of Wyoming.

Colorado

Mr. F. E. Mollin, Secretary of the National Livestock Association at Denver, was interviewed for the re-action of stockmen on the Forest Service grazing rates of the National Forests in the eleven western States, and, through his courtesy, grazing rates on the State lands in Texas, New Mexico and Arizona were secured.

Mr. H. E. Schwan, Assistant Supervisor of Range Management, Region No. 2, United States Forest Service, Denver, Colorado, supplied very valuable information in his interview on operations in Colorado, New Mexico and Arizona, particularly on sheep methods.

Montana

Mrs. N. Sherlock, Commissioner of Lands for the State of Montana, was interviewed at the State Capitol, Helena, Montana. Through her kind courtesy and interest in our investigation the fullest possible information was obtained on the problems of administration of State lands for grazing, as well as the recently created Montana State Grass Conservation Commission, which is a decided advance in the realm of conservation of this great natural resource of the vast plains area of North America.

The information obtained from Mrs. Sherlock, an experienced and most capable administratrix, is, in the opinion of the Appraiser, of great value to the Committee, due to the State of Montana adjoining the Province of Alberta on the south with similar types of soil, topography and climatic conditions prevailing.

Indian Service, U.S. Department of the Interior, Montana

Through the courtesy of Mr. C. E. Brackett, U.S. Forest Service at Billings, Montana, conditions, rates and methods prevailing on the Crow Indian Reservation in Montana were secured. The Appraiser also observed the grazing experimental plots on this Reservation in the course of his trip.

The rates and carrying capacities on the Blackfoot Indian Reservation, Browning, Montana, were obtained from the Indian Agent at that point for matters of comparison.

U.S.—General

General range conditions along the entire route of the trip, covering some twenty-eight hundred miles, were closely observed, as such route in the majority skirted and cut through the western side of the short grass area of the States of Montana, Colorado and Wyoming.

General stock and agricultural conditions were observed and information regarding same was obtained by interviews with officials, stockmen and other interested parties.

Conditions on irrigation projects in the States of Wyoming and Montana were observed, together with the effect of sugar beet operations in these States, which included operations of the Great Western Sugar Company's plant at Billings, together with its prices of beet pulp and other by-products to the livestock industry, the effect of these prices to the range industry being checked.

Information on local conditions in different districts was obtained from bank officials, State and Federal authorities, stockmen and other interested individuals, making a total of over forty who were interviewed in the course of the twelve days which the trip embraced.

Short Grass Area, Alberta

As mentioned previously, the general conditions of the short grass area of Alberta were studied carefully by the Appraiser in order to get a proper perspective of the entire picture.

The ranches of the Short Grass Association selected to be checked were then inspected. Where possible the Appraiser was accompanied by one of the members of the Special Committee. Of the twenty ranches chosen, it was only possible to visit sixteen due to weather, roads, or other factors which prevented the inspection of all those selected.

The ranchers were interviewed with numbers being placed on the information blanks and values from the book records being shown when such were obtainable. Where complete records were not available, the Appraiser obtained same by questioning the rancher on the five items set forth by the Committee, together with any other information relative to the investigation, and with any special climatic, soil, or grass factors being noted.

The information was then consolidated on larger forms to obtain the general picture from which conclusions could be reached on the facts obtained from the individual ranches, large and small.

BIBLIOGRAPHY

During the course of such inspection work the Appraiser found, in the study of some of these more specific problems,

that they were also involved in a larger field of general conditions affecting the industry as a whole. A resume of the Report, therefore, is also submitted with some recommendations dealing with the larger questions.

Many individuals outside the Association were contacted and interviewed, as well as those with whom it was necessary to obtain contact in writing. The Appraiser wishes to thank them, one and all, for their kind co-operation in making this Report possible, as well as those whose names have been mentioned previously.

He desires, also to express his sincere thanks to the members of the Associations Special Committee for their information and help in the investigation and Report. A complete list of the individuals, to whom we are indebted for information in the preparation of this Report, is appended.

A large and comprehensive bibliography is necessary in an investigation of this size and nature and one is attached to this Report. The Appraiser is especially indebted in this connection to Mr. Harold Long, Editor of "The Lethbridge Herald", for some of the historical data from that paper's files. Also, grateful thanks are expressed to Mr. F. Albert Rudd, B.A., L.L.B., Lethbridge, for the use of his thesis, "Production and Marketing of Beef Cattle from the Short Grass Plains Area of Canada, 1935", which has been invaluable due to the exhaustive and painstaking effort made in the preparation of this work.

The Appraiser, in dealing with some of the different range problems involved, has made use of his own Graduate Thesis "Scientific Range Management, 1924", submitted for graduation at the University of Saskatchewan, Saskatoon, which dealt with many of these factors, and also a personal scrap book of data on drought and range conditions in western Canada dating back to 1920.

Western Stock Growers' Association, Calgary, Alberta

The above Association for the course of some time has been requesting the Honourable N. E. Tanner to make a review of the Provincial Grazing Regulations, for the purpose of giving a greater amount of security of tenure to the lessee, not only in the short grass area but also, in the other ranching sections of the Province as well.

As a result Mr. Tanner met the Grazing Committee of the W.S.G. Association, consisting of Mr. James Mitchell, President, of Medicine Hat; Mr. Douglas Hardwick, Armada; and Mr. Kenneth Coppock, Secretary of the Association, in Edmonton on January 25th, 1940. Mr. John Harvie, Deputy Minister, and the Appraiser were also present, representing the Department.

A round table discussion of the regulations took place and certain changes were agreed upon with a view to giving a greater amount of security of tenure to the lessee. These embraced some of the recommendations which it was intended

should be embodied in this Report, with some additional features suggested by the Western Stock Growers' Association. These changes will be dealt with in the course of this Report.

The Appraiser wishes to express his appreciation to the Western Stock Growers' Committee for their assistance and for the broad, fair-minded attitude of the Committee members in the discussion of the many questions presented and in appreciating the problems involved in the administration of the regulations as a whole. Unquestionably, the above appreciation will express the feelings of both the Minister and the Deputy Minister as well.

OUR CONTRIBUTION TO CANADIAN AGRICULTURE

This investigation and Report, due to the limited amount of time available for the investigation, cannot, of necessity, in its conclusions and recommendations be deemed by the Committee to be the final word upon the many and varied problems involved.

The Committee feels, however, that the results of this investigation may be far reaching in their scope, presenting for examination as they do the experiences of other places where similar problems are contended with, and the nature of attempts made to find permanent solutions, all of which are set forth within this Report.

The Committee trusts that in the more or less new ground which this investigation and Report attempts to break, that the way will be shown to relieve the burden upon the land of the tax factor by placing some of the load upon the productive factor, which, after all, is the real basis of all true land values, namely, the ability of the land to produce.

It is the sincere hope of the Committee, therefore, that such investigation may prove of service, not only to the Government and the Association, but also to the range industry of the Province of Alberta as a whole; and that it may, also, be a worthwhile contribution to Canadian agriculture by assisting to rehabilitate the land of the short grass area in its preservation of the greatest natural resource of this area, the natural grass cover, for this and for future generations of this great Dominion.

THE SPECIAL COMMITTEE,
SHORT GRASS STOCK GROWERS' ASSOCIATION,
per C. GRAHAM ANDERSON,
Grazing Appraiser, Department of Lands and Mines.

INTRODUCTION

The preface to this Report has outlined the reasons for the formation of the Special Committee and the sources from which, together with the methods employed, the information contained herein has been secured.

The Appraiser is desirous of pointing out that a great deal of use is made in this Report of the information obtained from the Dominion Range Experiment Station, Manyberries, Alberta.

This Station was established at the request of the stockmen in 1927 by the Dominion Department of Agriculture, in co-operation with Messrs. Gilchrist Brothers Ltd., of Wildhorse, Alberta. Messrs. L. B. Thomson, B.Sc., and S. E. Clarke, Ph.D., of the Dominion Experimental Farms Branch, who originated the work, and the Assistant Superintendent, Mr. H. J. Hargrave, B.Sc., resident at the Station, and their assistants, have carried out experiments of great value to the stockmen.

Many stockmen are thoroughly conversant with the valuable work that this Station is doing with a view to assisting in the solution of the large number of problems which confront the stockmen in the complex economic structure of the present day world. There are, however, many stockmen in the short grass area and other ranching areas of Alberta who possibly are not as familiar as they might be with the results of the Station's work which represents for them a financial benefit.

The agricultural scientist and research workers may develop many valuable facts and methods which will benefit the industry, but, unless these are put to a practical application by the individual therein, a great deal of the value of these scientists' painstaking work is lost.

The industrialist, in the keenly competitive business that is his, is quick to make use of the information in his particular line of benefit and profit, which the National Research Council or the industrial engineer has made available for him. He may change his whole methods of operation and even scrap his entire plant and machinery in order to keep in advance of the times. Witness, for example, Henry Ford's scrapping of his immense plants and machinery of the old Model "T" Ford car in order to produce a better and more up-to-date one in his Model "A".

The stockman should be as ready after careful thought to make the necessary changes and adjustments in his business, in light of the latest information available; and know what his competitors are doing with the raising of the product with which his own is in competition in the world's markets. Too often, perhaps, the stockman, being an individualist and engaged in a lifetime occupation, may be imbued with the tradition, methods and experience of his forefathers. He may believe that methods which were good enough for his father are good enough

for him today. There may not be anything wrong with such methods but the world in the meantime has moved on and their use today may prove too costly if he is to survive and to progress in the business.

An attempt is made, therefore, in this Report to put into practical application some of the results of the Dominion Range Experiment Station's work, and the operations and methods in operation in the United States, which appear to cut costs. "Brains know no international boundaries!" There should be no prejudice in making use of the other fellow's experience in whose markets a large proportion of our livestock appears. He has perhaps been quicker to change because his problems may have been more aggravated or magnified by the greater numbers involved or the vastness of the areas affected.

The findings of this Report, it is hoped, will be deemed a worthwhile contribution to the preservation and conservation of that unfailing resource of the short grass area, namely, grass. To the stockmen it must be pointed out that the information contained herein is in no manner an attempt to tell him how to run his business, but a co-operative effort to assist him in the solution of some of his problems with some suggestions as to how others are cutting their costs of production.

One prominent stockman of Wyoming in a public address recently stated that the last era was one of "Corporations, while this one must be one of Co-operation."

Such appears to be true, that if the stockman is to make progress in this era he will have to be perhaps less of an individualist and co-operate to the fullest possible extent with his fellow stockmen for the benefit of the industry as a whole with ultimate benefit to himself by such action.

In order, therefore, to understand some of the problems which confront the stockman of the short grass area, it is necessary to understand something of its location, its history, and other facts to show how Nature has endowed it for the purpose of supporting a primary industry, namely, livestock grazing. This vast area has so many advantages by reason of its natural forage cover. In the past we have failed to recognize the climatic factor, and the importance of cereal production with its consequential effects upon this natural industry—the range grazing of livestock—which brings us up to its resultant problems with increased costs of production and new methods to meet these new economic factors.

The latter contribution by the industry has been made possible chiefly as a result of the following four factors—topography, soil, climate, and forage cover. In any study of this area it is necessary, therefore, to define, as nearly as possible, this large south-east portion of the Province, and show briefly its relation to the great plains area of the continent in order to fully comprehend its problems and suggested remedial measures.

Many of its present day problems are the direct outcome of false conceptions of the area in question, based upon the

premise that all the land therein was capable of producing large yields, annually, of high grade cereal crops without taking the climate into consideration which, after all, is the controlling factor.

This condition is not local only to Alberta but to southwestern Saskatchewan, and to parts of the western States as well, which lie to the south of these provinces. One authority in the United States, in referring to the Homestead Act of that nation, states that "Underlying the original homestead law and all modifications of it since passed, is the assumption that the entryman is to receive, as a gift from the nation, an area of land which, if properly worked, will furnish him and his family a reasonable living. In the humid region 160 acres of farming land was rightly judged to be sufficient. The law was made when everybody considered the areas here referred to as semi-arid and arid grazing land, to be part of the 'Great American Desert', and few ever expected that it would be used for any kind of agricultural purpose. At that very time, however, there was growing up the industry which led the way to the occupation and the use of these lands—the range grazing of stock." The same applies to Canada and to Alberta.

The homestead acts of both Canada and the United States made no differentiation in their application to humid and semi-arid lands and their effects have been far reaching because of their general application, now involved in the question of land utilization, which is briefly dealt with later in the Report. E. O. Wooton, Bulletin 1001, U.S.D.A., 1922.

THE SHORT GRASS AREA OF ALBERTA

The short grass area of western Canada is generally referred to in newspapers and magazine articles as the short grass plains. Technically speaking, however, the term short grass plains, in referring to this area, is incorrect, as Dr. S. E. Clarke, Agrostologist, Dominion Department of Agriculture, has pointed out.

In this connection the following quotation applies: "the area is more properly designated the short grass prairie area, as distinct from a true plains area which is dominated by gamma grass and buffalo grass, such as exists in the western and north-western United States."

The average citizen is not fully aware perhaps of the economic value of the short grass area from a livestock sense to the Province as a whole. He is more likely to be familiar with the fact that some of these lands in good crop years have produced wheat crops of better than forty bushels to the acre, followed by long drought periods as a result of which large sums of public moneys have had to be expended in seed and feed relief measures.

The average citizen may have consequently overlooked the fact that throughout the good years, and those of extreme drought, the livestock industry has continually made its direct contribution to the national income in the value of livestock produced, despite many natural and artificial impediments which

have been placed in the way of its progress. This has been done incidentally, with a minimum of governmental assistance. *Thesis by Mr. F. Albert Rudd, B.A., LL.B.

THE SHORT GRASS PRAIRIE AREA, ALBERTA AND SASKATCHEWAN

This area constitutes a part of the first plateau or steppe of the prairies of Saskatchewan and Alberta, formed by the settling of the glacial waters in the geological formation of these lands in past ages. The exact boundaries of the short grass area are rather difficult to define but the Dominion Government Investigating Commission in 1913 defined that portion of the western prairies, which they recommended be set apart for grazing, upon which section the Grazing Regulations of 1922 were based. They defined the area briefly as follows: "Starting at Field and running straight east through Drumheller to a point approximately south-east of Saskatoon, 107° west longitude, thence south-east to a point north-west of Moose Jaw, 106° west longitude, thence straight south to a point south-west of Moose Jaw, then south-east to 49° latitude at 104° west longitude, following the International Boundary, thence west to 114° west longitude, thence north-west to the Crowsnest Pass and to Field."

This grazing area, however, embraced the mountain and foothills area as well, so that the western boundary of the short grass area of Alberta would run approximately from the International Boundary south of Cardston through Cardston to Lethbridge, thence due north to the point of intersection of the Red Deer River in Township 30, with the north boundary of the area as before defined.† The eastern boundary of the area for Alberta would be the 4th Meridian, the boundary line between Saskatchewan and Alberta, and the International Boundary on the south. This in area approximates a little over forty million acres with about the same in Saskatchewan, being the northern part of the same area in the United States, which has an additional 135,000,000 acres of similar lands, taking in most of Montana, east of the Rocky Mountains, the north-eastern quarter of Wyoming and north and south Dakota lying west of the 100th Meridian, except a small area in north-central North Dakota. This area comprises 152,000,000 acres, of which 17,000,000 acres are devoted to crops which include hays, cereals and forage.‡ The 135,000,000 acres of grazing lands, mentioned in the above total of 152,000,000 acres, shows the multiplication of the problems in those States in comparison with those of this Province and some of the possible benefits which may be derived from the results of their experience in dealing with these lands. They have made many of the same mistakes in the handling of them as we have made in the past, and consequently their problems have been multiplied and the errors greatly magnified.

*F. Albert Rudd, Thesis, Report of Ranching and Grazing Investigation Commission, 1913, Dept. of Interior, Ottawa.

†F. Albert Rudd, Thesis. L. B. Thomson, Supt. Dom. Exper. Station, Swift Current, Sask.

‡Wilson, Wilcox, Klemmedson & Parr, U.S.D.A. Technical Bulletin, March, 1928.

Topography

The topography of the area in Alberta is generally that of large stretches of level land with a general slope to the south-east and north-east, separated by gently rolling areas cut by coulees and traversed by several large rivers.

This plateau or steppe has a general elevation of from 2,000 to 3,000 feet above sea level, with the Bow, Red Deer, Old Man, and South Saskatchewan rivers traversing the north and eastern portion lying upon the Arctic watershed. The southern part of the area is traversed by the Milk River, which flows south-east into the United States, being part of the Missouri-Mississippi watershed, the Milk River Ridge to the north of that river being the watershed dividing line. The major portion of the area is situated on the Arctic watershed as a result.

These rivers of south-eastern Alberta, in addition to supplying irrigation water for several irrigation projects along their courses, provide the main natural water supplies for stock within the region in question.

It must be pointed out that the Rocky Mountains to the west, where these rivers rise, also shut off this area from the sea and the moisture laden breezes from that direction.

Soil

The soil of any area, combined with climate, the controlling factor, determines the kind of natural forage which is produced. In this case the soil and climate, under normal and best climatic conditions, produce a very nutritious natural forage, producing curative qualities retaining the main nutritive elements after frost in the fall of the year.

This soil is described by one authority as follows: "Most soils of the short grass area, although somewhat lacking in nitrogen and phosphorous, are sufficiently fertile to produce a fair growth of vegetation in years of adequate rainfall. The surface soil on the uplands is mostly a very fine sandy loam mixed with varying amounts of silt. A definite 'hardpan' layer occurs at a depth varying from six inches to two feet. On the flats the soil is mostly gumbo clay, which is lower in organic matter but usually higher in moisture than the upland soils."* In some parts of the area the soils have a very high alkaline content, some having a heavy surface deposit of the salts in dry slough bottoms, while other parts of the surface have shallow depressions, known as "burnouts", some small in area whilst others extend to real "buffalo wallows", of as high as 50 feet in diameter. These "burnouts" are very deficient in humus matter and available plant food, thus constituting waste land from the standpoint of the stockman. Additional waste land is contained in some "badlands" which are heavily eroded with coulee banks of clay where erosion has taken place both by wind and water. In many cases these only provide shelter to stock for very short periods or give access to river water. The stock

*F. Albert Rudd, Thesis, "E. W. Tisdale—Our Native Pasture Plants—Their Characteristics and Distribution."

as a rule will not stay long in such locations. These waste areas constitute about from 8 to 10 per cent of the total acreage withdrawn from the range as a whole, though the percentage naturally runs very much higher in individual ranches, depending upon their location.

The highly nutritive value of the majority of the short grass area soils, without taking into full consideration the climatic factor, has been one of the misleading elements both in the use of these lands for cultivation of cereal crops and from the point of view of grazing rates upon range lands.

Climate

As already mentioned, the climate of the area is the controlling factor and is of great importance to the stockman, not only from the general standpoint but also from the point of seasonal climate both during the growing season and the winter season.

It has been pointed out, under the heading of "Topography" that the area is part of a steppe or plateau east of the Rocky Mountains, which is shut off from the sea by the high mountain range from which we get our prevailing west winds. These, primarily, are moisture laden and warm from the Japan Current of the Pacific. They are forced up by the Rockies, lose their moisture on the British Columbia side, and reach us as hot dry winds. It is simply the old principle of "the cold plate against the tea kettle spout", a warm moist wind which on striking an obstruction is forced up and meeting a cold current of air causes precipitation or rainfall. As far as the short grass area is concerned, however, this takes places on the wrong side of the mountains. The reader is reminded of the fact that this area is consequently a semi-arid to arid region, as are other parts of the world similarly situated, such as the Gobi Desert of China; parts of the northern plains of Manchuria, where they have a similar wind to our "chinooks" called "the Yellow Dust"; and the "Great Karoo" Desert of South Africa. It must be pointed out, too, that this great stretch of more or less level prairie, with but few obstructions to the wind, is a still further reason why there must be recurring periods of drought. It is possible to have a desert alongside the ocean because such may present no wind obstruction due to its levelness, such as in the Desert of South Australia. It is even possible that desert conditions may obtain over the oceans of the globe if such information could be obtained from mariners, but this we do know that periods of prolonged calm and lack of rainfall do exist over the ocean for long periods of time due to the lack of obstruction, especially over the Pacific Ocean*.

Many residents of the short grass area know from long experience and observation, together with checking weather reports, that when a period of warm "Chinook" winds is prevalent from the south-west that the residents of the Pacific Coast are usually undergoing a period of heavy rainfall in that area.

*Dean A. M. Shaw, College of Agriculture, University of Saskatchewan, Address—Regina Board of Trade—Regina, 1939.

The moisture laden warm winds, which we get from the south-east at some periods of the year from the tropics of Central America, blow up the "Great American Desert." If the timing of a cold wind from the Arctic regions is right then we get snow or rain. If such timing is not exact, then the farmers' long hoped for June rains, for example, do not arrive at the right time and his cereal crop is likely to be a failure or near failure. These same moisture laden winds may also strike the Rockies and return in about two to three days time from the north-west as general or localized Alberta storms, carrying either snow or rain, which in many cases may not reach the south-east section of the short grass area.

Other storms of a more or less local nature occur over the area, either as rain or snow, in the vicinity of high ranges, hills or river valleys. An example of such is the Cypress Hills which attain a height of 5,200 feet above sea level. Such hills exert an influence locally, which may make some localities relatively suitable for the growing of cereal crops when the general area, climatically, is unsuitable for anything but grazing.*

With reference to the two main air currents, previously referred to, the warm one is generally known as Tropic Air, and the cold as Polar Air. When encountering one another, the Tropic Air is forced to a certain altitude and the moisture precipitated by it falls in the summer as rain or later in the season as snow.

One authority, speaking on the subject of "Drought on the Canadian Prairies", refers to the irregularity of their timing and the resultant effects over the short grass area, as follows:

These two air currents are not by any means regular or uniform except in a very general way. This irregularity probably accounts for the fact that every year some parts of the prairie provinces as well as some parts of every state on the plains to the south fail to get rains at all or perhaps too early or too late in the season. This irregularity also provides the explanation when we hear a farmer say that he grew 40 bushels of wheat per acre on a certain quarter section in 1915 but has never been successful in securing as many bushels per acre since. His former success can only be duplicated when climatic conditions are again similar to those that obtained in his district just prior to and during the crop season of 1915.

There are also certain areas of the prairies that experience has shown to be surer crop districts than others. This is probably due to the fact that these areas are more nearly in the regular path of these winds, or at least where they most often meet, whereas certain areas are less fortunate and are frequently missed due to the vagaries of the air currents which control the precipitation.

The same authority has this to say with reference to the influence of high ranges of hills, such as those affecting Alberta, the Sweet Grass Hills and the Cypress Hills:

*See Selective Abandonment.

All of these ranges of hills are surrounded by typical plains or prairie country. They are all wooded more or less, and produce a much ranker type of vegetation than is to be found in the surrounding country. This is particularly true of the Sweet Grass Hills and the Cypress Hills. These are situated in the very heart of the Short Grass country where the average rainfall is about 12 to 15 inches. On the tops of these hills, it is from three to six inches more. The longest growing season in Saskatchewan is found at Maple Creek, yet only 35 miles south in the Cypress Hills the growing season (number of days between spring and fall frosts) is very much shorter, in fact, is about the same as at Prince Albert, a point 250 miles to the north.

Why do these ranges of hills get more rain than the flat country surrounding them? Simply because they form an obstruction to the warm moisture laden air currents which, in rising up over them, become lowered in temperature to a point where precipitation occurs. I have on many occasions seen snow on the tops of these hills when none was visible on the surrounding plains.

This would seem to indicate that the warm air currents were forced much higher as a general thing by hills than by the currents of Polar air encountered over the prairie country; and for this reason much greater precipitation is assured. The fact that even during the great and general drought of the last few seasons, the hills referred to have not suffered to any great extent would seem to indicate that, even in dry seasons, the warm air currents which pass over the plains, contain sufficient moisture if it only could be precipitated. The immovability of the hill is apparently the reason for the fairly regular annual precipitation. It is always in the same place, ready to intercept and force upwards a warm moisture laden wind no matter from what direction it may come.*

It has been frequently stated by many people, in the discussion of the drought problem, that rains follow the rivers. The seeming reason, however, for the recurrence of local storms along the course of rivers in the short grass area is possibly due to the same factor as described above, and the same authority deals with this question as follows:

There is apparently no data available to substantiate this point, but may it not again be a case of natural obstruction to air currents? The prairie rivers flow for the most part between high banks broken in places by coulees and deep ravines. It is quite possible that warm moisture laden air currents flowing through a river valley are sometimes forced abruptly upwards due to change in direction of the stream and the general topography of the country adjacent to these rivers.

Some of the Sand Hills areas of the short grass area are quite subject to local storms, concerning which Dean Shaw has this to say:

An examination of the Sand Hills area of the prairie leads one to the conclusion that more rain falls on them than on the surrounding prairies. Here again the explanation is probably the same, air currents flowing against the larger dunes are forced upwards sufficiently far to cause precipitation to occur.

*Dean A. M. Shaw, Dean of Agriculture, University of Saskatchewan, Saskatoon: Address—Drought on the Canadian Prairie—Regina Board of Trade, Regina, November 30th, 1934.

Every experienced stockman knows that the high hill ranges, as a rule, have greater carrying capacity for livestock than a similar area on the plains. The reason of course is that these areas undoubtedly possess greater supplies of available moisture due in turn to greater annual precipitation.

It would appear, therefore, that, to influence the climate or increase or control the precipitation of the Great Plains area on this continent was for the present, at least, almost beyond the power of man.*

Therefore, it can be realized that many local factors enter into precipitation on the short grass area, causing the necessity of dealing selectively with land utilization of many of these lands; but in dealing with the area as a whole, it is conceded that it has been endowed by nature to grow one crop best, namely grass, because of limited precipitation.

Interested observers over a long period of years have found that following the main line of the Canadian Pacific Railway the western line of demarcation of the semi-arid region is along Crowfoot Creek and its tributaries, where the elevation takes a very decided rise to above the 3,000 foot level. Local showers in that region for example peter out at a distance of about three miles east of the creek. For the same reason it is to be noted that bad hailstorms occur in this region around "the big hill" at Cluny.†

A study of the precipitation of the whole area over a long period of time will show that the average year must be anticipated as a dry year, while the exception will be a wet or abnormal year; also the presence of sage, prickly pear cactus and other semi-arid plants in the natural forage cover, shows that such plants are native to the area as a result of such climatic conditions. (See Forage).

It will be noticed upon the map, appended to this Report, and entitled "Physical and Climatic Map; Manitoba, Saskatchewan and Alberta; Department of the Interior, Ottawa, 1924", that the principal lines of precipitation follow, generally, the lines of elevation, if the contour lines are compared. This will, possibly, explain why there is often a fair crop in the vicinity of Comrey, when such does not prevail in other adjacent localities. Also, the Sweet Grass Hills, just across the boundary in Montana, exert considerable influence, as a result of their height, upon the surrounding country in its general precipitation effect.

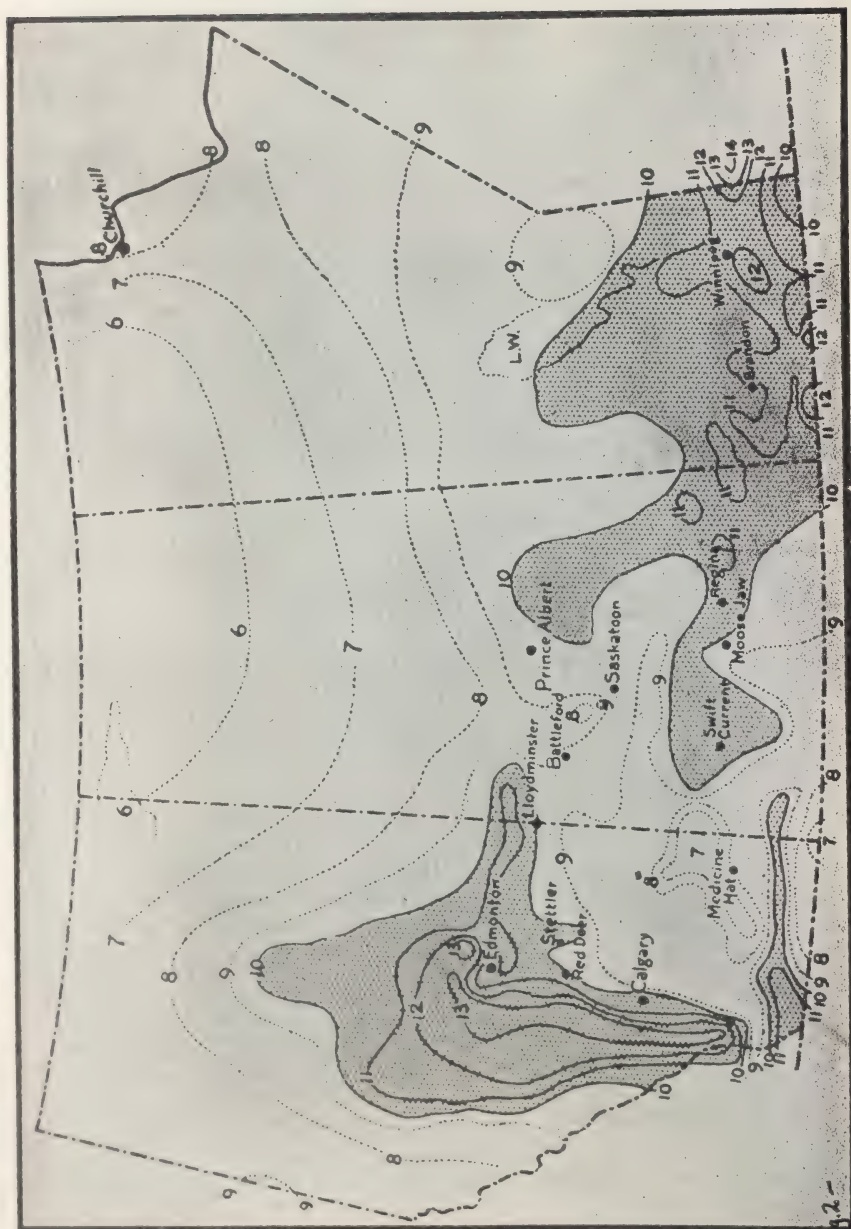
CLIMATE—PRECIPITATION

The small map on the following page is of interest as it shows the general effect of these lines of precipitation. The average annual precipitation is about 13 inches in the area.

*Dean A. M. Shaw, Dean of Agriculture, University of Saskatchewan, Saskatoon: Address—Drought on the Canadian Prairie—Regina Board of Trade, Regina, November 30th, 1934.

†A. K. Buckham and J. W. Chapman, formerly Department of Municipal Affairs, Province of Alberta.

Map, compiled by the Dominion Bureau of Statistics, showing precipitation during the growing season.



RAINFALL ON THE PRAIRIES*

The map on page 28 shows the average rainfall on the prairies from April 1st to September 1st over a period of 35 years. The shaded areas shown have a rainfall of 10 inches or more for the annual five months summer season.

It should be noted on this map that in the south portion of the short grass area of Alberta, the 10 inch strip is more or less following the Milk River Ridge—Cypress Hills elevations; and the dotted lines, "7-8" in the pocket, north of those elevations, are more or less bounded by Medicine Hat, Empress, Hanna, Bassano, Vauxhall and Taber. This means that the latter area has received only 7-8 inches of rainfall on the average for 35 years. It should also be noted that the same applies south of the Milk River Ridge and in the extreme south-east corner of the province, one of the driest spots of all, with an average of only 7 inches, a point that has been overlooked in the past.

A study of records at Medicine Hat will clearly show that the stockmen's problems in the short grass area are somewhat different to those situated in the more favoured grazing sections of the province such as the foothills section, particularly from a climatic and precipitation standpoint.

The Medicine Hat records are chosen as a study of rainfall figures from other points in the short grass area indicating that Medicine Hat, with an average annual rainfall of nearly 13 inches, is situated in the drier section of the area.

ANNUAL PRECIPITATION MEDICINE HAT

1884 to 1935 Inclusive†

The annual precipitation at Medicine Hat for the period 1884 to 1935 is presented in graphic form in Fig. 1. The portion in black represents the rainfall for the months of April, May and June, the period during which the native grasses make most of their growth.

It will be observed that both dry and wet years have occurred at Medicine Hat ever since records have been kept. The driest years on record are 1931 with 6.72 inches and 1886 with 6.38 inches, while the wettest year was 1927, with 25.28 inches. Very dry springs with less than two inches of precipitation occurred in 1910, 1918, 1924, 1931 and 1936 (not shown in Fig. 1). Definite rainfall cycles are not apparent, but it is obvious that precipitation during the years 1896 to 1902 averaged much higher than that of any group of years recorded before or since that period.

Rainfall during the two favourable years, 1915 and 1916, is linked closely with much settlement on the less productive portions of the short grass prairies, while the dry spell of 1917 to 1926 was the period during which most of these same areas were abandoned for farming purposes.

*Map by Major Duncan Stuart, Calgary, "The Canadian Desert." Figures compiled by Dominion Bureau of Statistics.

†Dominion Range Experiment Station, Results of Experiments, 1927-1936, inclusive. L. B. Thomson, B.Sc., Superintendent, Bulletin, Dominion Department of Agriculture, 1938.

Rainfall figures from other points in the short grass area indicate that Medicine Hat, with an average annual precipitation of nearly 13 inches, is situated in the drier portion. An average annual precipitation of 14.5 inches or more is recorded for Havre, Montana, to the south, Lethbridge to the west, and Swift Current to the east.

Precipitation records obtained at the Manyberries Range Station since 1928 indicate an annual average of about 11.3 inches, which is lower even than that recorded for Medicine Hat during the same period. The marked differences in precipitation which may occur within short distances are illustrated by the records kept at Comrey, Alta. This district, situated about 15 miles west of the Range Station, has received, during the past four years, considerably more rainfall during the period April to November of each year. Such local differences may account, in part at least, for the occurrence in the drier parts of the short grass area of favored districts where crop production has been moderately successful.

The following graph shows the above information, so that the variations can be quickly grasped and gives an exact bird's eye view of the mistakes and follies of past land settlement policies with regard to a large portion of the short grass area.

It should be noted that the solid black lines show the precipitation occurring in April, May and June, the period in which the native grasses make the most of their growth; and that about 40 per cent of such precipitation takes place seasonally during these months, during which period temperatures and evaporation are not excessively high for the majority of years.

The native grasses are well adapted to make the maximum use of such limited rainfall and to live under severe climatic conditions. Cereals, on the other hand, must have the exact timing of precipitation to make a crop, where grasses will make their growth if moisture comes any time within the growing season.

The graphic chart on the previous page is, in the opinion of the Appraiser, of such inestimable value that a copy of such should be on the desk of every bank manager, business executive and governmental official, who has to deal with the short grass area of the province. A careful study of this chart by such individuals would prevent some of the heart-aches and monetary losses in the future, such as have been made in the past as a result of the total disregard of such salient climatic facts.

The total annual or average total annual precipitation over a long period of years throughout the short grass area, however, does not tell the whole story, as the question of temperatures and evaporation, as well as seasonal precipitation, are important in the general picture and important to the stockmen individually.

Climate—Temperatures

The short grass area is marked with extremes of temperatures largely because of its geographical and physical features, as are found in other parts of the world similarly situated under arid or semi-arid conditions.

PRECIPITATION AT MEDICINE HAT 52 YEARS 1884-1935

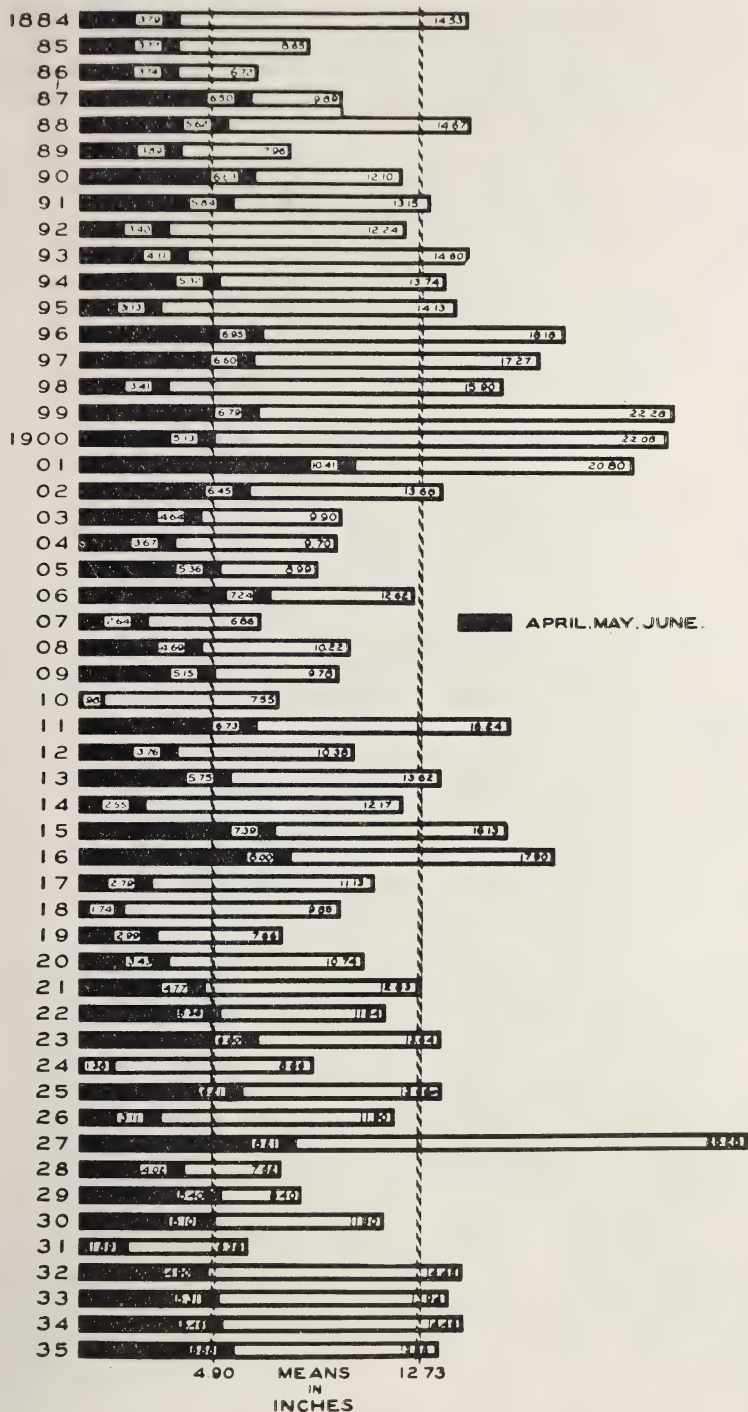


Fig. 1.

Graph, Dominion Range Experiment Station, Report, 1927-36, inclusive.

Summer Season

The early parts of this season of the year are generally marked with considerable precipitation and moderate temperatures conducive to good grass growing conditions. The majority of the native grasses of the area are short growing, rapid maturing varieties, which generally mature and set seed before the usual midsummer drought and high temperatures of July and August set in.

The usual drought of July and August is accompanied by high temperatures which range from 80 to extremes of 110 degrees in the shade, frequently accompanied by hot searing chinook winds of high velocity. Such a condition took place in 1939 after very promising crop prospects, as created by good, timely moisture in the early part of the growing season. The high temperatures and hot winds which came later cut the yield.

The usual summer drought has not quite the same effect upon the native grasses because of their finely branched root systems, which make them generally drought tolerant. They have short growing characteristics and are matured before the dry weather sets in, rapid growth being made during the early spring and summer periods when moisture conditions are favourable and temperatures are moderate. The majority of the grasses are able, therefore, to mature and set seed before the drought period of extreme temperatures and high velocity, hot, drying winds make their appearance. This adverse combination tends to very high evaporation rates throughout the short grass area, such winds sometimes reaching a velocity of over 50 miles per hour for short periods of time.*

Much of the summer precipitation in the short grass area comes in the form of local showers. These have little or no benefit to the vegetation as they amount to less than one-fifth of an inch per shower with small soil penetration, which is almost entirely lost through evaporation, due to hot, dry conditions which generally follow such summer showers.†

It must be pointed out here that, in addition to precipitation loss from evaporation and high temperatures, a great deal of moisture is also lost on rough or rolling lands by the rapidity of the run-off. Much of the value of melting snows on such lands in the spring is dissipated by the rapidity with which the snow melts. It is estimated that 60% of the value of the snow on such lands is lost by run-off, and conservationists have proven that 75% of the moisture which does fall on such lands, with some grass on the slopes, goes to the low places.‡

Climate—Evaporation

As pointed out under "Temperatures" and "Precipitation", the precipitation records, either annual or seasonal, do not give the entire picture of the moisture conditions in any specified area, for the question of soil types enters into the picture, as well as the rate of evaporation, the latter factor governing the amount of moisture left available for plant growth.

*Lethbridge Airport, A.M., March 15th, 1940.

†Dominion Range Exper. Station, Results of Experiments, 1927-1936, inclusive.

‡Soil Conservation Station, Dalhart, Texas, U.S.D.A., Scrapbook C.G.A.

The high summer temperatures in the short grass area, combined with high velocity, hot winds and low relative humidity of the air, tend to a very high rate of evaporation over the summer period.

The Dominion Range Experiment Station table shown below is worth careful study, as the rate of evaporation, in ratio to the precipitation, gives a fair indication of plant growth, with the more favourable conditions for such, in the lower ratios.

TABLE 1—PRECIPITATION AND EVAPORATION AT SOME POINTS IN WESTERN CANADA

Place	Average annual pre- cipitation (inches)	Average evaporation May-Sept. inclusive (inches)	Ratio of evaporation to precipitation. Pp'n. taken as 1
Manyberries, Alta.	11.31	32.0	2.8
Lethbridge, Alta.	15.96	24.9	1.8
Swift Current, Sask.....	15.31	27.7	1.6
Scott, Sask.	13.31	21.8	1.6
Lacombe, Alta.	17.49	16.4	0.9

NOTE—Evaporation is from a free water surface (open tank).

It should be noted that in this table the highest ratio is shown at Manyberries, followed by Lethbridge, with the lower ratios at Swift Current and Scott, Saskatchewan, and Lacombe, Alberta. The figures for Medicine Hat were not available for this table but are presumed to be somewhat the same as those shown for Manyberries. The average evaporation, May-September inclusive, at the latter point, is almost three times the average annual precipitation. It must be noted that the evaporation figures are from a free water surface, but a relatively high ratio must prevail from the ground under such conditions.

In order to bring the matter of precipitation and evaporation up to date, some figures on monthly precipitation at different points in the short grass area of Alberta are of interest in view of the reference, previously made, to the crop conditions of 1939.

MONTHLY PRECIPITATION—1939*

Place	April	May	June	July	Aug.	Sept.	TOTAL
Lethbridge	0.68	1.66	6.42	0.58	0.38	2.10	11.82
Whitla	0.55	0.92	6.86	0.43	0.16	0.82	9.74
Foremost	0.17	1.27	4.92	1.06	0.08	1.58	9.08
Etzikom	0.60	0.30	3.75	1.22	0.04	1.98	7.89
Cessford	0.20	2.00	4.43	0.56	0.29	0.25	7.73
Bindloss	0.20	2.81	2.98	0.78	0.24	0.05	7.06
Average area..	0.40	1.63	4.89	0.77	0.74	1.13	8.88
Evaporation, Lethbridge—							Monthly Average
1939	Nil	4.95	3.15	6.46	4.49	3.90	3.82
From free water surface.							

*Dominion Experimental Farms, Lethbridge, Alberta—Records.

It is interesting to note how the total precipitation of 11.82 inches at Lethbridge for the summer months drops as the distance from the mountains increases, with Bindloss near the Saskatchewan line showing only 7.06 inches. It is to be noted that Whitla, in the vicinity of Medicine Hat, is next to Lethbridge with a total of 9.74 inches, while points south and north-east of there are considerably less. This can possibly be explained by a local condition, due to elevation, as Whitla is situated on a ridge with an elevation of 2,748' above sea level, while Bow Island, immediately to the west, has an elevation of 2,621' and Seven Persons to the east, on the other side of the ridge, has an elevation of 2,480', about 300' lower. (See previous remarks under Precipitation).

It should be noted that the elevation of Lethbridge to the west is 2,983' above sea level.

The Appraiser has noted local storms during the summer of 1939 and the winter of 1939-40 centering around the ridge at Whitla and petering out west of the ridge, and with Bow Island experiencing little if any rain or snow from them. Due principally to the prevalence of winds from the south-east and north-east during this winter, considerably more snow lay all through this season east of this ridge than west of there, while at Lethbridge little or no snow lay on the ground the major portion of the winter. It was noted that there was no frost in the ground at a depth of 6 feet at Lethbridge by the middle of March, 1940.

In comparison with certain points in the southern part of the province some precipitation figures for Calgary are of interest as the elevation of that city is well over the 3,000' level and it is situated close to the foothills of the Rockies.

PRECIPITATION, CALGARY AIRPORT, SUMMER MONTHS*

Year	April	May	June	July	Aug.	Sept.	TOTAL
1936	0.64	2.16	1.47	.13	1.51	1.13	7.04
1937	1.44	1.84	3.22	2.50	1.98	2.57	13.55
1938 .....	.74	3.44	2.58	3.06	1.87	.82	12.51
1939	1.09	1.42	7.98	.68	.51	1.50	13.18
Average.....							11.57

Total Annual Precipitation, 1938, Calgary Airport, 16.69 inches.

Total Annual Precipitation, 1939, Calgary Airport, 19.08 inches.

The Relative Humidity, Calgary Airport, 1939, 5:30 a.m., 73%.

The Relative Humidity, Calgary Airport, 1939, 5:30 p.m., 54%.

It can be seen from this table that with the exception of 1936, Calgary had a rainfall in the summer of well over 13 inches and in 1939 13.18 inches as compared with 11.82 for Lethbridge, and an average for 1939 for south-eastern points of only 8.88 inches, which gives some idea of the variation in rainfall conditions, almost eight inches of Calgary's rainfall was in June, making for good crop conditions, while Lethbridge, as shown in the previous table, only received 6.42 inches in June. Also, Lethbridge's evaporation in July last year was more than the June precipitation of 6.46.

*Records, Lt. Comm. C. H. Bromley, R.N.R., Dom. Meter. Serv., Airport.

Calgary despite its high elevation and nearness to the mountains had a relative humidity for the year 1939 of 73% at 5:30 a.m., while it dropped to 54% at 5:30 p.m., almost 25%, which gives some idea of the evaporation during the daylight hours.

It must be pointed out also, that southern Alberta enjoys a very high proportion of sunlight throughout the year, and particularly throughout the summer months which is a factor in the amount of evaporation.

In order to fully appreciate the amount of evaporation which took place in 1939 at Medicine Hat, the following statement, giving the precipitation during the summer months, with the highest and lowest temperatures for each month, together with some of the maximum wind velocities, further explains the high evaporation factor.

AIRPORT, MEDICINE HAT, ALBERTA, 1939*

Summer Months

Month 1939	Precipitation		Temperature			Wind, Maximum	
	Inches	High	Date	Low	Date	Dir.	M.P.H.
April .....	.89	92°	29th	15°	5th	N.	21
May	1.22	88°	14th	24°	10th	N.W.	27
June	4.26	86°	30th	35°	1st	N.W.	21
July .....	.73	104°	28th	46°	3rd	W.	42
August .....	.31	97°	4th	30°	30th	N.W.	43
September	1.23	89°	4th	27°	28th	S.W.	36
	8.64						

It will be noticed that Medicine Hat had a precipitation of 4.26 inches in June, compared with Lethbridge's 6.42, followed by a high of 86° on the 30th with a maximum wind velocity in July of 42 miles per hour, and a high temperature of 104° on July 28th, while the July precipitation was only .73 inches; the combination of these factors may account for the wide variation in crop returns throughout the short grass area during 1939 after promising June rains mentioned previously.

The prevailing high winds at Medicine Hat are shown to be from the west.

The total precipitation for Medicine Hat for the summer was only 8.64 inches compared with the Lethbridge total of 11.82, a decrease of over 3 inches and 1.10 inches less than Whitla, situated about 20 miles south-west on the ridge.

Some of the previous remarks are borne out by some salient facts from the 1939 Weather Report of the Range Experiment Station at Manyberries for the summer months, reproduced as follows:—

Month	Max. Temp.	1939			Total Hours Sunlight
		Precpn.	Evapor.	Wind Mileage	
April	90°	.40	1.35*	9321	210.9
May	85°	.56	6.06	9282	274.8
June	84°	2.97	5.70	8074	168.5
July	101°	1.16	10.91	7165	349.2
August	97°	.21	9.46	7726	302.5
September	93°	.65	6.14	7050	207.1

*April 16th-30th only.

*Records, Dom. Meter. Serv., Medicine Hat Airport, 1939.

The total wind mileage for the year was 96,062 miles.
Total hours of bright sunlight 2,317.3 hours.
The total evaporation for the months shown, 39.62 inches.
The total precipitation for the year was 9.67 inches.
The total rainfall, in four growing months of April, May, June, July, 1939, was 5.09 inches.
Twelve year average precipitation for the 4 growing months—5.42 inches.
The eleven year average, annual precipitation, 10.84 inches.
The twelve year average, annual evaporation, 36.74 inches.

The year 1939 began with a favourable start. At Manyberries, however, it will be noticed from the above that the total rainfall during the growing months was only 5.09 inches. Adding to this evaporation, wind and hours of bright sunlight it must be conceded that the station is situated in one of the driest sections of the short grass area and in what is possibly the driest area of the province, though situated between the Cypress Hills and the International Boundary.

The reader can compare these facts with those from Lethbridge or Calgary Airports for 1939, or with the data gathered at Medicine Hat, so that he may fully realize the evaporation factor throughout the short grass area.

The foregoing examples show the amount of evaporation which takes place on the prairies and particularly throughout the short grass area. In this connection, it is perhaps advisable to deal with some common misconceptions with regard to evaporation.

It has been freely stated, in many articles dealing with the drought question in Western Canada, that if more trees could be planted upon the prairies that it would reduce soil drifting and evaporation. They have their place in the picture, as shelter belts for buildings and vegetable gardens; but the growing of great wind breaks and hedges across the prairies would appear to be an impossibility. It must be remembered that trees require a great deal of moisture and that they give off a great deal of moisture through their leaves during the growing season. It would appear, however, that grown under prairie conditions they would consume more moisture than they would give off.

It is true that it is necessary to provide wind protection for vegetables grown on the prairies, but it is doubtful if ordinary farm crops will respond equally with farm vegetables, as the growth habits of most of the cereals are more nearly like those of the native prairie grasses which grow naturally under prairie conditions.

It is often stated that the planting of trees across the prairies would prevent soil drifting. It is advisable to remember, however, that soil drifting has to do with the physical condition of the soil. One authority states, "Soil drifting has to do with the physical condition of the soil, whether it is wet or dry, whether it is rough and lumpy or fine and granular, whether it is bare or exposed or whether it possesses a cover of plant growth. It does not depend primarily upon obstructions that may be placed in the way of the prevailing winds."*

*Dean A. M. Shaw, University of Saskatchewan, Regina Board of Trade, 1934.

Snow fences do not prevent the snow from drifting but cause it to pile in drifts. Witness, also, the soil piled high around the shelter belt of any abandoned farmstead in the short grass area.

Dry, sparsely covered range can also drift, as one of the worst dust storms the Appraiser ever experienced occurred just south of Brooks, in 1937, off range land, sufficient to pit the car windshield by the force of the soil particles.

Soil drifting, either on cultivated land or range land, appears to be associated with temperature and evaporation, as the Appraiser has noticed that the majority of it occurs when the temperature appears to drop or rise to from 54-56° F. It is his opinion that the use of manure to prevent drift on either kinds of land has not so much to do with the change in the soil constituency, as in the heating and cooling effect upon it, and prevention of evaporation, which prevents the soil from reaching the above approximate temperature. This appears to be the point of equilibrium where the wind has the maximum lifting power of the soil particles from the ground surface. It is also his opinion that some interesting results might be obtained by a careful study of this phase of the question by the Dominion Experimental Farms, as this is an important problem both to the farmer and to the rancher.

Many people, not completely aware of the full facts of the matter, have expressed themselves to the effect that the governments of the western provinces should follow the example of the United States in planting a great shelter belt and wind break north and south across the prairies to reduce evaporation and soil drifting in drought periods. Most people expressing such opinions, however, are not aware of the location of the United States tree shelter belt.

Dean Shaw has this to say on the question, "I am fully aware of the efforts being made by the United States along this line and wish to draw attention to the fact that their great windbreak will extend almost due south from a point just east of the Saskatchewan-Manitoba boundary. It does not at any point touch the driest area of the great plains but is confined mainly to territory where the annual precipitation in many cases averages 20-22 inches. In the minds of many, this windbreak is being planted in territory similar to the drought area of Western Canada. Nothing is farther from the truth; in fact, it has been moved eastward several times since it was first mooted, probably for the very good reason that it has been realized by those in charge that it would have no chance of surviving if placed upon naturally treeless plains where the precipitation averages 12-16 inches annually. So much then for trees. Admittedly they have a place and can be used effectively but their usefulness will always be definitely conditioned by the amount and nature of the annual precipitation."

The theory is often advanced in discussions of climate and evaporation in the short grass prairies, that if we could create large lakes and fill the sloughs that the evaporation from the soil would be reduced and the climate affected.

Dean Shaw deals with this phase as follows:—

Next, consideration will be given to the theory advanced by some, that if it were possible to create large bodies of water or artificial lakes on the prairies by damming or diverting streams, that the climate would be favourably affected. The inference is that because of the evaporation that would take place, more moisture would be available for the growth of plants. In other words, they contend that the proximity of water has a direct connection with the surrounding climate and that it definitely tends to cause greater precipitation.

I will admit that water, either as found in natural bodies or as saturated soil in large irrigation projects definitely produces a more humid atmosphere in its immediate vicinity, but that this humidity has any bearing upon the actual precipitation of that particular area is harder to prove.

Let us for a moment take a look at some of the arid or desert regions of the world. Where are they?—far inland or on the sea coast? The majority of them are bathed on one entire side by the ocean. In German South West Africa, the country is almost completely arid for a hundred or so miles inland. Thousands of square miles of territory produces nothing but the typical desert flora and no change occurs until the elevation caused by ranges of hills, located far inland, cause the warm moisture laden air to rise sufficiently high for precipitation to occur. And yet this vast territory forms the shore line of the Atlantic for hundreds of miles. Let us go to the West Coast of the North American Continent and give some consideration to the southern part of the State of California and the northern part of Western Mexico. Here again we find similar conditions—typical desert country extending far inland and yet its entire western edge is bathed by the waters of the Pacific ocean. Desert conditions are also found occasionally in the interior of continents. They are for the most part caused by obstructions such as high ranges of mountains. An illustration of this is to be found in Central Oregon where a mountain range obstructs and precipitates the moist air currents from the Pacific resulting in producing the wonderfully luxuriant growth to be seen in Western Oregon whereas, immediately east of the mountain range, almost desert conditions obtain. I have said almost desert conditions because these inland deserts are seldom, if ever, entirely devoid of vegetation as are the deserts that border the oceans.

Let us go and investigate some of the conditions that obtain on some of the islands of the Pacific. Take the case of the Hawaiian Islands. Some of the group are volcanic in origin and hence have high mountains while others are devoid of high hills and present a level or gently rolling appearance. What of the vegetation which, after all, is the correct indication of the precipitation? It is abundant and luxurious in the mountain areas but extremely sparse on the level lands. The many high mountains which intercept the moisture laden trade winds from the north-east cause heavy precipitation on their windward slopes. Near the top of Mount Waialeale, Kausi, at an elevation of 5,080 feet above sea level, the annual precipitation is 476 inches, said to be only exceeded by a point near Shillong in India which gets 485 inches, while on the leeward slopes of the same mountain, dry and arid conditions prevail, the precipitation ranging from three to twenty-four inches. There are also many completely arid plains to be found in parts of the islands.*

*Dean A. M. Shaw, University of Saskatchewan, Regina Board of Trade, November, 1934.

One might mention many other islands where precipitation is extremely variable, but these illustrations should suffice. The reason for this dry condition is that certain islands of the sea, as in parts of Australia, are entirely devoid of mountains and also because air currents pass over them in one general direction without meeting air currents of lower temperature. In fact, I am inclined to think that, if one could chart a precipitation map of the oceans, there would be found in certain latitudes large areas where precipitation was very low, corresponding exactly to the semi-arid districts so common on level prairie lands and for precisely the same reason.

Dean A. M. Shaw's opinion regarding the possibility of drought conditions prevailing over parts of the oceans in certain latitudes is borne out by the experience of Lieut. Commander C. H. Bromley, Royal Naval Reserve, Weather Observer, Dominion Meteorological Service, Calgary Airport, from his experience in the service of the British Navy in various parts of the world. In this connection he draws attention to the fact that such is the case on the Pacific Ocean off the west coast of Chile, where such drought conditions prevail not only over the ocean but for great distances inland.

Dean Shaw also points out—"Some would have us believe that, in areas where many thousands of acres are farmed under irrigation and where the ground has become saturated that changes in the precipitation may be expected. There is no evidence that anything like this takes place. In fact, the isolated areas that are too high to irrigate, or are 'above the ditch' as the irrigationist would say, continue to produce exactly the same kinds of desert flora as were to be found on the whole area in the beginning. No, the proximity of the water does not seem to have much effect upon the precipitation of the surrounding territory."

If such contention were true, then the irrigated districts should get a rain every day, which is not the case, as for example in the Eastern Irrigation District at Brooks, where the average summer annual precipitation for a period of 35 years is from 7 to 8 inches. True, the humidity is greater, due to evaporation from the saturated soil, ditches and reservoirs, and heavier dews may occur than upon dry areas to the east or west of the district, but the precipitation is not affected. The land is irrigated because the average annual precipitation is insufficient to grow and mature cereal and fodder crops.

It appears that so far as the scanty precipitation is concerned, it is a matter of endeavouring to conserve the maximum amount of water which does fall. If the irrigation farmer runs ditches to put water upon his land for the purpose of giving it needed moisture, then why should not the dry farmer and the stockman run some ditches at strategic points to slow down the run-off on their best land, which may possess too steep a slope? A very considerable amount of this work has been done by the United States Conservation Service at their Soil Conservation Station at Delhart, Texas, while the Dominion Range Experiment Station at Manyberries has started some interesting work in this connection which should be watched with interest by every stock-

man of the short grass area. The protection of the forage by grazing methods, giving a heavy grass cover will, too, prevent erosion.

CLIMATE—WINTER SEASON

The rancher in the short grass area is, of course, vitally interested in the winter season, as well as in the extremes of temperatures, precipitation, evaporation, growing season and periods of prolonged drought. Winter extremes of prolonged low temperatures and unusual depths of snow affect his feed supply, periods of feeding and consequently his costs of operation.

In the short grass area a great many of the same series of factors, as before mentioned, which produce extremes of temperatures, periods of low precipitation, hot dry prevailing winds, hot, dry summers, on the contrary work on an average basis to the benefit of the stockman during the winter season.

Winter seasons in southern Alberta, although marked by relatively brief periods of extremes of temperature to 40° below zero, with the occasional bad snowstorm or blizzard, are considerably higher in average temperature than areas to the north and east. The snow, like the summer precipitation, is generally light and powdery. It is quickly removed by the warm Chinook winds from the south-west. The Appraiser has found, however, in his travels that there are many districts which are pockets and which do not benefit from the effects of the Chinooks except to crust the snow, thus preventing some winter grazing. These sections though benefited by temperature rises are faced with the necessity of feeding entirely throughout the winter season. An example of this is just south of the Cypress Hills, where the effect of the Chinooks and deeper snow is encountered, and where the removal of snow is slower in the spring, than to the west or north-east of there.

The precipitation value of the snow is to a large extent either lost through the spring run-off, or by its dry powdery nature. It should be remembered that it takes 12 inches of snow on the average to equal an inch of rainfall.

The Medicine Hat district during the winter of 1939-40 had considerably more snow than usual, which measured on the average, a depth of one foot on the level all winter with several wet, heavy snow storms in late March and early April. The result was an unusually high monthly precipitation for the month of April, 1940, as compared with other years being well over the 3-inch mark in comparison with .89 of an inch in April, 1939.

The area is subject to the occasional early blizzard in the fall of the year or to late storms in the spring, such as occurred in the spring of 1938, causing losses on some ranches of as high as 20% of their herds; these, in many cases, were caught while moving from winter to summer range, though some of these losses occurred where stock were well protected, due to the intensity and duration of the storm, with its effect upon young lambs, calves and their mothers after the winter period.

The climatic factors combined with the nature of the native grasses with their curing qualities during the summer season provide, however, highly nutritious fodder for winter grazing, making it possible for all types of livestock, except calves and lambs, to graze in most sections the entire winter in an average season. For these reasons the short grass area may be considered a real ranching area, adapted by nature for the raising of healthy livestock which is relatively free from disease and parasites.

CLIMATE—GENERAL

It may be advisable to draw the reader's attention to the general classification of land, as used in the Western States, to give a broad basis of possible use of these lands, depending upon the average annual precipitation, the latter being merely used as a rough means of limiting areas.

*Definition of Land as to Average Annual Rainfall:

"Desert" lands are those where the average annual rainfall is so small—usually less than 6 inches—that there is very little if any permanent drinking water for stock, and consequently year long grazing is not practicable. Of course, cultivation of any known crop on this land without irrigation is an impossibility.

"Arid Grazing Lands" are those where year long or seasonal grazing is assured, but where any kind of cultivation of crops is possible only a small part of the time or not at all, and upon only a very small part of the area. The average rainfall, annually, of this area ranges from 6-15 inches.

Where the average rainfall, annual, is from 15 to 20 inches, cultivation of certain crops is often possible when topography, soil conditions and the seasonal distribution of rainfall are favourable and the growing season is long enough; but the farm practices are those of the system called "dry farming" and the land here is called "semi-arid" or "dry farming" land.

Of course, these subdivisions are more or less arbitrary, but they are necessary in order that we may consider the best utilization of the different regions with some degree of accuracy.

The determining natural conditions are not the average climatic conditions. They are the absolute minima, and the relative frequency with which these minima may be expected to occur. We do not need to be told that citrus fruits can not be grown with profit in a region where the temperature goes to zero for a longer or shorter time one year in five, no matter what it may do the other four years; but it seems to be necessary to demonstrate by trial and failure that crop farming can not be made to support families on land where periods of drought lasting one, two, three, and even four or five seasons in succession are known to occur with more or less regularity—periods of drought so severe that no known cultivated plants can be expected to endure them and produce a crop.

It will be seen that on the basis of average annual precipitation, the majority of the lands in the short grass area fall in the upper brackets of the arid grazing and semi-arid lands, the latter in the lower brackets, with many of the lands in the south-east arid-grazing represented by Manyberries with an

*U.S.D.A. Bulletin No. 1001, "The Relation of Land Tenure to the Arid Grazing Lands S.W. States"—E. O. Wooton.

average of 11.3 since 1938, and Medicine Hat for 35 years at almost 13 inches. Lethbridge to the west with 14.5 inches for the last 35 years comes close to the lower bracket of the semi-arid. From the foregoing it has therefore been shown that from the controlling climatic factors the short grass area is primarily endowed by nature to be a grazing country, proven by our trial and error methods of the past, with exceptions, noted from local conditions, permitting of successful dry farming.

One of the difficulties, which has possibly been the result of mistakes in the past in the short grass area, so far as farming attempts have been concerned and their resultant effect upon the grazing industry, has been the encroachment from barely semi-arid into the arid grazing lands class with cultivation holding little chances of success. This has been due to the fact that many cereals, such as wheat for example, have root systems more closely approaching the native forage plants of the short grass area. Consequently, more men in periods of high prices and somewhat favourable moisture conditions, were encouraged to break the thin sod and embark upon farming to their sorrow, and to the curtailment of the range industry.

CLIMATE—SUMMARY

It is a common saying in Alberta that "only fools and newcomers predict the weather" in this province. Despite the fact that it is impossible to predict the future weather, a study of the climate of the short grass area, however, as shown in the foregoing, points out that wide variations have occurred in the last forty years, and consequently will occur in the future as history repeats itself.

As far as the stock industry is concerned, a policy of moderate grazing and conservation of grass is clearly outlined by such history. It is shown, also, that over the major portion of the area the growing of cereal crops is precarious except in the minority of favourable years and in the more climatically favoured localities. The necessity, also, of providing surplus feed supplies in years of above average precipitation is emphasized.

Considerable space has been devoted to climate. Too often in the past, as a result of wishful thinking, we have been prone to ignore these facts to the detriment of the individual and national economy, in their influence as the controlling factor in land utilization.

FORAGE—SPECIES

Based upon soil and climatic conditions, the type of forage which is produced is of prime importance to any area as a live-stock region. The short grass prairie area produces under the soil and climatic conditions outlined, a hardy, drought resistant, which is a quickly growing natural forage type, highly nutritious for the grazing of livestock.

The Dominion Range Experiment Station at Manyberries has conducted extensive surveys classifying the different species

and their palatability, as well as their life histories. It is, therefore, not necessary to outline these in this Report, except to point out the six predominant grass species by their common names. These are low growing perennial grasses which constitute 90 per cent of the total grass cover and are as follows:—Long-awned spear grass, blue joint or western wheat grass, blue grama grass, June grass, Sandberg blue grass and nigger wool.

Non-grass forms comprise about 25% of the total vegetative cover, some of which are sagebrush, prairie sage, salt sage, silver sage, dwarf phlox, cactus, wild rose, willows and native legumes.

The low growing grasses have well developed, fibrous root systems, presenting small leaf surface to the elements, and so are adaptive to drought conditions.

The Range Station states,—The principal grass species are well adapted to withstand the rigorous climatic conditions and to utilize efficiently the scanty precipitation. Most of the chief grasses begin growth late in March or early in April and develop rapidly during April, May and June when moisture conditions are the most favourable. Usually a certain amount of seed is produced before the customary drought of midsummer begins. Curing occurs during July and August of most years.

During recent dry years the growth of range grasses has been below normal. This has been particularly noticeable during the summer of 1936, when over large areas many of the grasses did not head out and little or no seed was produced. Much of the grass was “burned” or cured before the end of June, and even on pastures that were protected during the drought, together with overgrazing, has resulted in killing out most of the grass plants in certain areas and the weeds have taken possession of the pastures. In general, range pastures on the short grass prairies are in a badly depleted condition, and their carrying capacity is at a very low level.*

Some improvement has taken place since then due to favourable growth conditions in 1938 and 1939, when the majority of the species produced seed, some on an extensive scale and for the first time for eight or nine years. Two years growth, however, will not remedy the result of many years adverse conditions. It must be pointed out that such seed production will have an effect upon the range cover in following favourable growth seasons if careful management exists upon the range.

It must be pointed out that the grasses grow in association with other grasses and plants, and that they make progress in such associations. Under overgrazed conditions, the grass retrogrades in the same progression, with the more palatable species showing the most damage, whilst the least palatable species, show consequently the best stands. An overgrazed condition of the range is, therefore, clearly indicated by certain “indicator” plants. These are generally taken as *artemesia frigida* (prairie sage), which through overgrazing and further aggravation by drought, has become predominant on many ranges. Another good indicator of a range “slipping” is the drop in percentage of “winter fat”, a palatable winter range forage.

*Results of Experiments, 1927-36, inclusive, Dominion Range Experiment Station, L. B. Thomson, B.Sc., Supt., Dom. Dept. of Agric., 1938.

The Appraiser has from his experience generally taken the artemesia as the best indicator of overgrazing, as it is the most easily seen without a careful examination. Mr. N. A. Skoglund, B.S.A., Plant Investigator at the Range Experiment Station, states, however, that the amount of nigger wool is a good indication to the stockman as to whether or not his range is being overgrazed, which should be observed before it has reached the artemesia stage when it becomes more noticeable, and harder to correct, due to more extensive damage having been done to the forage cover.

It must also be pointed out that with sod land, ploughed up and then reverting to sod, the grasses come back slowly in the same progression as they have deteriorated, namely annual weeds first, then biennials, and last but slowest, the best perennial grasses. As a result, the process of rehabilitation is very slow and the carrying capacity of such lands is therefore extremely small. Especially is this true of lands which have been cultivated long enough to work the fibre out of the soil. The Appraiser is aware of some land which, after forty years of reversion to sod, is still in a poor state of rehabilitation for good forage cover. *

The Range Experiment Station keeps a check on the forage growth condition at the Station by means of quadrats and transect studies, following the methods used for many years by the United States Forest Service in its grazing studies. Use is also made of check plots, which serve as a check on the grazing condition of their fields, as such plots are under total protection. It would appear, therefore, that it would pay every rancher to have several such check plots in every one of his large fields to keep a close check on the condition of the forage in each and leaving as little as possible to conjecture. These could be constructed at small cost of posts and wire, and in the Appraiser's opinion will pay for themselves many times over by means of the information secured which it is so necessary for him to know. In this connection the Range Experiment Station will no doubt be glad to co-operate in the matter of checking.

The Station has made careful analysis of the different forage plants with a view to determining the approximate nutritive value to livestock of each species in different stages of growth and as grown under different conditions. This is most important, and its importance has not possibly been fully realized by even the stockmen themselves, regarding its bearing upon production costs on the general welfare of the herd and on the calf crop. (S Calf Crop % & Costs.)

The five most important species are closely allied in their chemical analysis, so they have been grouped under one table of averages as presented below, which is a table every stockman in the short grass area could well afford to hang alongside his calendar as a reminder that it is the time of year to do certain things if he is to continue to cut costs for his financial benefit.

*G. C. Millar, Sheepman, Taber, Alberta.

AVERAGE CHEMICAL COMPOSITION OF FIVE PRINCIPAL GRASS SPECIES, COLLECTED IN DIFFERENT GROWTH STAGES

Stage of Growth	Protein %	Fibre %	CHO %	Fat %	Ash %	CaO %	P2O5 %
Leaf	18.00	24.23	46.17	2.53	9.33	0.561	0.602
Flower	9.61	32.33	48.95	2.41	6.82	0.400	0.414
Seed	7.06	33.54	50.70	2.32	6.46	0.419	0.291
Cured	5.00	33.02	51.76	1.81	8.52	0.530	0.187
After winter exposure.....	4.18	34.82	50.79	1.26	9.00	0.512	0.178

It will be observed that, in the early leaf stage, these grasses have a high protein content and contain sufficient calcium and phosphorous to meet the requirements of range livestock. As the plants mature, become cured and are exposed to winter conditions, the percentage of protein and phosphorous drops to a very marked degree. After these grasses have passed the flowering stage there is a marked deficiency in phosphorous content. This indicates that livestock should have access to a mineral supplement such as mono-calcium phosphate or bone meal, preferably mixed with stock salt, during the late fall and winter months at least. Many stockmen have already adopted this practice, using chiefly mono-calcium phosphate, which is giving very satisfactory results. *

It should be noted that the calcium, in the second last column of the above table, only drops from .561 in the leaf stage to .530 when cured. But phosphorus in column 7 drops from .602 to .178 when cured. This is most important to animal welfare and also in its bearing on the calf crop with its direct result on the costs of production.

The Appraiser has found in his investigations in the Western States that the stockmen there pay more attention to the matter of proper salting and feeding of mineral supplements to their range livestock than do the ranchers generally in the short grass area of Alberta. There is an opinion amongst some stockmen on the short grass prairies that stock on the range can get their salt requirements in alkali places on their range, but an analysis of such alkali may show that the necessary elements are either not all present or are not in proper proportion for livestock.

The calcium content remains more or less stable in the forage, the fluctuation being more or less due to seasonal conditions and varies very slightly. The phosphorous fluctuates, however, quite violently in the different growth stages, and the proportion to the calcium has an important bearing upon animal growth and reproductive factors as shown by scientific experiments in different parts of the world. Too much stress cannot be placed upon the mineral factor from information dealt with later in this Report, which has been obtained on this question from different sources.

The Dominion Range Experiment Station has found from various studies that the principal grasses are palatable to all classes of livestock throughout the entire year. Also, that some of the non-grass forms such as salt sage, silver sage, etc., are quite palatable. Some of the less important grasses and some species of browse plants have been found to be more

*Results of Experiments, 1927-36, inclusive, Bulletin, Dom. Range Exper. Station, L. B. Thomson, B. Sc., Supt., Dom. Dept. of Agric.

readily eaten in winter than in summer, the browse plants being more generally consumed by sheep than by cattle.

Native grasses of the short grass prairies are somewhat deficient in lime and phosphorous, as are similarly situated areas, such as in South Africa, and this deficiency possibly may have to be made up by feeding mineral supplements.

They have found at the Station that the weight gain decreases with the decrease in protein content but the fall increase in carbohydrate content puts a hard tallow finish on the cattle to withstand low temperatures. A cattleman of world wide experience some years ago stated "that the native grasses of these prairies put the best hard tallow finish on cattle of any place in the world." *

It has been shown that spring pasture must not be overgrazed the previous fall or winter in order to allow sufficient roughage to mix with the green grass high in protein content and water. Gains on early spring grass will be low, will reach a maximum in the summer and will decrease in the fall with the finish hardening then.

FORAGE—STOCK, WATER

As shown under Climate, it is necessary for the stockman in years of abundant rainfall, to cut hay for periods of drought, such as was experienced during the period up to 1938, when it was not possible to cut hay of any kind and when whole herds of cattle had to be brought through the winter on Russian thistle. The development of small irrigation schemes by many ranchers is one method of insurance against a recurrence of such a situation.

The Appraiser has found in his investigation that some of the worst overgrazing has occurred in the vicinity of natural and artificial water-holes, due to improper salting methods. An insufficient number of stock water-holes, necessitating stock having to go too far for water results in the farthest range being under grazed and the range close to water practically denuded. One of the crying needs on the ranges of the short grass area appears to be the construction of additional water holes for the prevention of over grazing and the better distribution and utilization of the forage cover. Large dams are not necessary, "as a reservoir is no more valuable than the area it will serve economically." Cattle which have to go more than two miles to water will not make normal gains in weight. The placing of these is important, for cattle are just like humans, they will take the easiest way or the line of least resistance. The United States Forest Service has found by actual experiment that cattle will go downhill four miles to water, in preference to going half a mile uphill to better water. Every stockman can well afford to study the methods at the Range Station with a view to adopting them to his own conditions. Fuller use could also be made by the stockmen of the assistance available to them by the Prairie Farm Re-Habilitation Act officials in Alberta, in con-

*The late Murdo MacKenzie, President of the Matador Land and Cattle Co. Ltd., Denver, Colo., "Operations of Ranch at Saskatchewan Landing, Sask."

nection with their stock watering needs. All that is required is the making of an application and assistance will be forthcoming, with the engineering help and advice, if necessary, rather than the stockman having to attempt something with which he may not have had much experience.

FORAGE—SALTING

Dealing with the matter of salting operations in connection with forage and its proper utilization, the Appraiser has found that in the western States the majority of stockmen and stock associations use the loose stock salt, making use of such in strongly constructed troughs. They use this in preference to rock salt in blocks as it can be used in mixing mineral supplement with it. It has another advantage over the block salt in that more cattle or sheep can make use of the salt. How many times have you noticed some old cow monopolize the salt all day long, licking the block to the disadvantage of the rest of the herd? Due to the particular construction of the troughs and their being anchored to the ground they cannot be upset and only a minimum of salt is therefore wasted.

The greater use of mono-calcium phosphate in the western States than here is possibly due to the fact that it has been on the market at a reasonable price for a longer time than in Western Canada, where the Consolidated Mining and Smelting Co. Ltd., have more or less pioneered its use. Bone meal supplement has been available for some years by the different packing companies, but generally the rancher has been slower to use this than the hog raiser, the dairy farmer or the pure bred breeder, due possibly to the feeling that cost did not justify the cash outlay. However, the Appraiser's opinion, after viewing the results of its use in commercial herds and experiments, is that the rancher cannot afford to overlook its possibilities in the results of dollars and cents.

FORAGE, RE-SEEDING

Where the forage has been either badly over-grazed or else is slow to rehabilitate itself on reverted land, the Range Experiment Station has conducted reseedling operations over a wide area. From the ranchers' standpoint, this is more than worth while, but besides the operations of the Station and other governmental agencies, the individual rancher can do a lot to assist himself in the rehabilitation process. The Station has found that crested wheat grass is the best for the purpose due to its habits and to the fact that it is a prolific seeder, soon choking out the more undesirable weeds; but it must be pointed out that the native grass will rehabilitate itself, if given a proper rest.

One rancher carries a bag of crested wheat grass seed in his car every spring and as he goes over his range he has been broadcasting seed in likely places where it will have a chance to grow. Every rancher could follow this method, which though not as good as drilling in the seed properly, makes, however, a start in favourable seasons, such as in the spring, for growth during the current year. Every rancher from a small

expenditure for seed could in such favourable years grow and harvest a supply of his own seed for more extensive operations.

The Range Station has found that double disking of the native sod on upland range has improved the vegetable cover as it breaks up the hard surface, giving better moisture penetration by breaking up the dense mats of club moss and giving a taller growth of grass together with increased seed production. Experiments of this kind on a wide scale in the Western United States have produced similar results.

FERTILIZERS

Barnyard manure spread over the native pastures at the rate of 10-15 tons per acre at the Range Station has greatly increased the yield of grass. Some plots manured in 1928 and not treated since are still producing double the amount of forage obtained from adjacent untreated plots, while in other cases four times as much has been obtained. The manure not only adds fertilizer to the soil but reduces the temperature and decreases the rate of evaporation.

In the Western States there have been three periods or eras in livestock operations, the Appraiser has found; first is the open range with no supplemental feeding in the winter; second, the putting up of hay, hauled to the herd and fed in sheds or small pastures close to the buildings. The third era, now in practice and particularly in parts of Montana, represents one step ahead of our operations here, namely, the baling of hay which is hauled and fed to the herd on winter range, or to their irrigated meadows.* It presents several advantages, the facility of handling less waste and the fertilizing value of the stock manure on the range or hay meadows with the minimum of labour. Also, better gains have been recorded on less feed, with smaller stock losses than under the second method which was a great improvement over the first, with its "barb wire for shelter, and an alkali lick for feed in a howling blizzard", reminiscent of Charlie Russell's famous picture, "The Last of the Herd." "We have found that a cow is generally like humans, that if she can get fed without much effort she will do so; but unless she has to rustle for it she does not get enough exercise to make full use of it, making for waste in feeding." Consequently, baling and feeding under these methods more than pays for itself.

Therefore, in the Appraiser's opinion, such methods are worthy of consideration of the short grass rancher here with a view to cutting his costs.

CARRYING CAPACITY DEFINED

The capacity of range forage, to withstand the grazing of livestock in good commercial condition without deterioration to the grass cover and a reasonable carry over of old grass from year to year, determines its carrying capacity. Due, possibly, to the stress of times, both here and in the States, not sufficient attention was paid to such a definition, until the great natural resources of the area, grass, has been nearly lost to this and

future generations. It has only been in the last few years that the stockmen here have realized it, and possibly for a slightly longer time across the international line, due to the magnitude of their problem, as compared with ours in numbers of acres affected.*

The United States Forest Service early realized the necessity of accurately determining the carrying capacity of the ranges and the effects upon different grass species and the cattle themselves. They set up the Jornada Range Reserve in New Mexico in 1915 and part of their results are quoted to show how long ago they realized its importance in the U.S.A.

To decide the number of stock that a range pasture or large range will carry year after year is one of the most difficult problems of range management. Private pastures, as well as range lands, are often overstocked and slowly depleted unintentionally through lack of knowledge of their carrying capacity and the effect of the overstocking upon the forage production. The problem is complicated by the following facts:

1. The stand of forage is rarely uniform over any considerable acreage of range lands.
2. Different amounts of forage are produced on the same area in different years.
3. Forage plants vary in power to resist grazing.
4. Other things being equal, the carrying capacity of dry ranges over a period of years is influenced materially by the extent of grazing during the growing season of the vegetation.
5. If there are not enough well-distributed watering places to insure even distribution of the stock and even grazing over the whole area, the range is depleted around water and undergrazed away from water. This may reduce considerably the number of stock the area will carry.
6. The number of stock carried will depend somewhat upon the condition in which the animals are kept—whether merely carried through the period, kept in good condition or fattened.
7. Reliable data are not available as to the comparative amount of range needed for dry stock and cows with calves, or for yearlings and mature stock.

Where so many variables are involved, it is obviously difficult to work out figures for carrying capacity which will insure 100 per cent efficiency in utilizing large areas of range. It is believed possible, however, to work out figures for the more prominent types of range which will serve as a safe guide in stocking a given unit and in deciding the comparative value of different range areas.

JORNADA RANGE RESERVE

Within the Jornada Range Reserve was found range varying from that which will furnish year-long feed for one mature animal on about 20 acres to that which will barely support a mature animal on, perhaps, 100 acres. Further, the different types of range are somewhat intermixed.

During 1916 the Jornada Range Service as a whole supported one animal, not including unweaned calves, on an average of 41.45 acres. The estimated maximum carrying capacity of the Reserve in its present stage of development is

*Howell Harris, Highwood, Montana, Cattle Rancher—E. V. Sandvig, U.S. Forest Service, Missoula, Montana.

38.1 acres per head. The estimated carrying capacity of similar unfenced range in its present average condition is at least 50 acres per head.

The range on the plains where grama grasses form the bulk of the forage, will support stock throughout the year at the average rate of one head to from 20 to 30 acres, depending upon the proportion of the real grama grass type. This figure is for range in good condition, fairly well supplied with stock water, and which is lightly stocked during the growing season.

INCREASE IN CALF CROP AND IMPROVEMENT IN GRADE OF STOCK

From 500 selected cows and 20 bulls, held in pasture away from other stock since August, 1915, an 81 per cent calf crop was branded in 1916. It is expected that this figure will probably be an average one over a period of years. From the remaining cows of breeding age, amounting to 1,522 head run together in one pasture of 74,714 acres, a 69.2 per cent calf crop was branded. The average calf crop for the Reserve was 72 per cent. It is doubtful whether the average calf crop on adjoining unfenced range in 1916 reached 60 per cent, and this figure is believed to be a high average for the calf crop on these ranges for a period of years past.

A total of approximately 50 pounds of cottonseed cake per head was fed to the 500 cows and 20 bulls of the selected breeding herd on the Reserve. The work of caring for this herd took half of one man's time. All the bulls and perhaps 75 per cent of the cows were fed cake. To this special care and the fact that they were unmolested by other stock is attributed the large calf crop. In the herd having 1,522 head only 2 per cent of the cows and only 75 per cent of the bulls were caked. This and the fact that so many animals were run in one large brushy area, making adequate bull service difficult, are believed to be largely responsible for the difference of 11.8 per cent in the calf crop of the two herds. If so, the extra calves in the special herd far more than pay for the extra feed and labour.

The big opportunity for increasing the calf crop is to keep poor cows in thrifty condition. This can be done by not overstocking the range used by breeding stock and by feeding a small quantity of cottonseed cake or other supplemental feed to the cows that need it. Indications are that this is a good business proposition. All bulls should be fed during the winter and early spring.

By avoiding overstocking and by using supplemental feed the improvement of the average animal should pay, at least in part, for the decrease in number of stock and increase in cost of care. The increase in the calf crop will pay for the greater part, if not all, of the increased expense. Marked improvement in average grade is noticeable among stock of the Jornada Reserve as a result of selling off about 25 per cent of the poor-grade, off-coloured, and otherwise undesirable stock, and replacing them by good grade heifers.

U.S.D.A. Bulletin No. 588
INCREASED CATTLE PRODUCTION ON
SOUTHWESTERN RANGES

By

James T. Jardine, Inspector of Grazing.
L. C. Hurtt, Grazing Ex.

In line with the work of the United States Forest Service work, the Dominion Range Experiment Station at Manyberries upon its establishment commenced this most important study on carrying capacity to determine the proper carrying capacity of the range, based upon the work already done in the United States and adapted to Canadian conditions. This work is quoted below.

GRAZING CAPACITY

The regulation of grazing to conform to the carrying capacity of grazing lands is one of the most important principles involved in cattle production in range areas. Overgrazing of pastures results in a serious reduction of the pounds of beef produced per unit area of land. The number of cattle grazed on a certain area may remain the same, but the amount of beef produced will be lowered. There is greater risk of losses among the breeding herd during winter when pastures are overgrazed. Further, many years are required to restore to good condition pastures which have become depleted through overgrazing. These are some of the findings in an experiment conducted at the Manyberries Range Station during the past five years.

In order to obtain definite information on grazing capacity, an experiment was begun in 1931 in co-operation with Gilchrist Brothers. A typical area of grazing land, close to the Station headquarters, was chosen for the experiment. Yearling heifers were selected from the Gilchrist herd and divided into several uniform lots, which were grazed continuously on pastures at different rates, viz., 20, 30 and 40 acres per head. The summer grazing season was from April 1 to November 15, while the remainder of the year constituted the winter season. In addition, the practice of deferred and rotational grazing was studied at the two lower grazing rates. All animals were studied individually in order to avoid errors in the weighings at different periods. Quadrat studies were made of the pastures to determine the changes that occurred in the grass cover. The same animals were used each year, the object being to use them throughout the life of the breeding cow, which is approximately eight years. At the end of the summer season the cattle were placed together on a winter pasture at the rate of 20 acres per head. The pasture contained several coulees which afforded natural protection during bad storms. The cattle were not fed hay except when it was absolutely necessary to feed the weaker ones.

The response of the different lots as shown by gains in weight is presented in Table 3. In the case where a three-year-old cow raised a calf, the weaning weight of the calf was studied as well. The table refers only to the lots grazed at 20 and 40 acres per head respectively.

TABLE 3—COMPARISON OF WEIGHTS OF COWS AND CALVES AT DIFFERENT CARRYING CAPACITIES

Year	20 Ac. per head	40 Ac. per head	Differences in Wgt.	
	Wgt. Nov. 10	Wgt. Nov. 10	Cows	Calves
	No.	No.	No.	No.
1933	949	984	35	....
1934	1,053	1,142	99	64
1935	1,043	1,173	130	42
1936	911	1,158	247	59

Note—The experiment began with yearling heifers in 1932. The first calves were produced from the three-year-old heifers in 1934.

The table shows clearly the difference in weight of cows and calves grazed at different carrying capacities. The difference became more striking each year that the experiment was conducted. This is due to: (1) The cumulative effects on the animals; (2) the cumulative effects of the grazing treatments on the grass cover; and (3) the effect of a series of very dry years. In 1933, at the beginning of the experiment, and under nearly normal rainfall, the differences in the response of the two lots were slight.

The general condition of the animals as they enter the winter is of vital importance. Cows and calves in poor flesh will not winter as well as those in good flesh and the risk of loss and cost of feed is much greater in the case of the former. Fig. 4 shows the difference in condition in the late fall of some of the cows used in the experiment. The 20-acre cows lack finish and are in an unthrifty condition to enter the winter. While the changes in weight during the winter period were in favor of the 20-acre lot, that fact alone does not indicate the true picture. The more fleshy cows of the 40-acre lot made better use of the winter pasture and were in a better, thriftier condition in the spring of the year because they had stored up reserve flesh the previous summer and were able to withstand the severe winter conditions. This fact was particularly true in the winter of 1935-36, which was one of the most severe winters ever experienced in Southern Alberta. It was necessary to feed 60 per cent of the 20 acre lot, otherwise they would have died, whereas it was necessary to feed only one of the 40-acre lot for a period of 17 days. These results definitely illustrate the expression heard commonly among experienced stockmen, i.e., "winter the cattle in the summer time." The growing of winter feed is a large item in the ranch operations and even if there is an abundance of feed, the extra costs involved and the frequent unthrifty condition of the animals outweigh greatly the costs of providing good pasture during the previous summer.

Further differences were reflected in the results obtained in summer grazing. The 40-acre cows made rapid gains on grass and produced calves of normal weaning weights, whereas the 20-acre cows lost weight and produced calves averaging 55 pounds per head lighter at weaning time. These lighter calves, in addition to the loss of weight represented at weaning time, were more expensive to winter than were the calves of normal weight.

Growth studies conducted in this experiment gave very definite results. The 40-acre cows showed a marked gain in the development of the chest and other important parts of the conformation. They were well developed and would be regarded as a good type of range breeding cow, having sufficient development of bone and substance in the body. The 20-acre lot would be regarded as "scrub" range cows, lacking proper growth development. This fact brings out clearly the point that improper nutrition seriously affects the growth of the animal no matter how good the sires and dams may be and that nutrition is equally if not more important than breed type in the range herd.

Besides the loss in beef by overgrazing of pastures many other related problems arise. An unthrifty animal is more subject to infection by virulent diseases. Mineral deficiencies occur and prevent proper growth development. Bone chewing becomes prevalent and it is necessary to feed a mineral supplement to correct this condition.

The effects of these different intensities of grazing on the grass cover of the pastures is determined by means of quadrat studies, yield tests and per cent carry-over.

It has been found that during the years 1931-1936, inclusive, fields grazed at the rate of 20 acres per head had practically no carry-over of grass at the end of the grazing season. Quadrat studies conducted on these fields show that there has been a definite decrease in the grass cover and in certain parts there has been an increase in weed growth. See Fig. 5. At present the indications are that if this intensity of grazing is continued the grass cover will become badly depleted, weed growth will increase and the carrying capacity of the fields will still further be decreased.

In the fields grazed at the rate of 30 acres per head, changes in the vegetative cover have been less marked. The carry-over of grass has been somewhat low and quadrat studies show that there has been a slight decrease in the grass cover. In fields where 40 acres per head is allowed, the grass cover has been maintained in good condition. The carry-over has ranged from 25 to 35 per cent and quadrat studies show that there has been no significant decrease in the grass cover. See Fig. 5.

The results of this experiment provide useful information in determining the grazing value of range land. While climatic conditions may vary slightly and the carrying capacity of the land may be more or less changeable, the results from this experiment would be basic to any such survey conducted. The experiment is being continued and a bulletin will be published at a later date giving more detailed results.

TABLE 5—GAINS IN WEIGHT OF CATTLE ON DIFFERENT SYSTEMS OF GRAZING, 1928-1936

	Continuous Grazing	Deferred and Rotation
Grazing period	214 days	214 days
Yearling heifers	306 lbs.	298 lbs.
Yearling steers	333 lbs.	310 lbs.

The above table shows those cattle grazed on the continuously grazed field made a higher average gain for the nine year period. While the difference is not marked, the figures indicate that in following the deferred and rotation plan there is no advantage as far as the cattle are concerned. The difference in gain was consistent for the nine-year period.

GRAZING PRACTICES

(1) Continued overgrazing results in the killing out of the principal grass species. Secondary grasses of a lower forage value and weeds, some of which are poisonous or otherwise harmful to livestock, take possession of the ground and the carrying capacity of the pasture is greatly reduced.

(2) In semi-arid areas, once a pasture has become depleted and weedy it takes a long time to come back to its normal condition. Plots on the Station pastures that have been protected from grazing for eight years show very little increase in grass cover. The change that takes place is not so much an increase in the total plant cover, but rather a decrease in weed content and a corresponding increase in grass cover.

(3) Early spring grazing is much more harmful to the native vegetation than is grazing at any other time of the year. Plots that have been protected from grazing during April

and early May for several years in succession have much better grass cover than have the adjacent, unprotected areas.

(4) Depleted pastures may be improved by grazing during the late fall or winter months only for several years in succession. This allows the grass plants to make their normal development and to produce and shed seed. The seedlings also have a chance to become established.

(5) Fields that are to be pastured during the spring months should not be grazed too closely during the preceding fall, as a mixture of old grass among the new makes the best pasturage for early spring use.

(6) In order to maintain the grass cover of range pastures in good condition there should be a carry-over of grass at the end of each year's period of grazing. This carry-over should not be less than 25 per cent of the season's growth.

(7) On large fields which are not overstocked, cattle practice a sort of natural rotation by their habit of grazing any one area only partially at any one time.

(8) Where proper grazing practices are followed the native range grasses maintain dominance over weed types.

(9) From studies conducted on approximately 1,000 quadrats it has been found that there has been a slight decline in the grass cover of range pastures at the Manyberries Station during the past five years. These pastures have been grazed at the rate of 40 acres per cow for the period April 1 to November 15.

This summary of the Station's findings upon carrying capacity could perhaps find a useful place on the Stock grower's calendar, or where he can easily see it, as an assistance to him in his multitudinous duties as ranch manager in planning his operations.

Department of Agriculture,
Dominion Range Experiment Station,
Manyberries, Alberta.

Results of Experiments 1927-1936, Inclusive

L. B. THOMSON, B.Sc.,
Superintendent.

HISTORY—A RECORD

In dealing with some of the historical background of the short grass area, it appears that possibly the rancher does not fully realize the value to himself, and to the country as a whole of the historical background of the industry in the area in which he is engaged.

It is the Appraiser's opinion, that the individual should be proud of his brand, its background and its history and not be backward in advertising the same in trade magazines, such as the "Canadian Cattleman", and prominently displaying the name upon his boundary fence gates. An example of this is given in an attractive ranch entrance on one of the main highways in Wyoming, where the following notice is displayed: " Ranch, Established 1882", for all and sundry to see. That is one of the few ways that the rancher has of advertising his wares and making the public conscious of his value to the community and the area as a whole.

Also, it might be pointed out, the work of the Wyoming Stock Growers' Association, in collecting old branding irons of old ranches and former members, and prominently displaying them on some of the main streets of Cheyenne. Amongst other things this is a help to the Historical Society and the University of Wyoming offering historical data, old implements, saddles, riatas, ropes, bits, etc. Such action is commended to the different stock growers' associations for their attention as being deemed important. Too long has the stockman been relegated to the background of public attention, while the grain grower pushed and advertised his ware, emphasizing their importance in the public economy. Consequently, the stockman, without the expenditure of a great deal of money or effort, can do much to further his own interests in co-operation with his fellow stockmen and through the strong and active participation of his Stock Growers' Association. Continued support of the Calgary Stampede, incidentally, is extremely good advertising.

To demonstrate that others have realized the importance of such historical data of the livestock industry, the following editorial of the "Calgary Herald," of Saturday, May 18th, 1940, is quoted, in full, as follows:

HISTORY SHOULD BE RECORDED

The days of the old west are disappearing into the mist of forgotten things. It is regrettable that a greater effort is not being made by writers and historians to preserve in books and pamphlets the intimate history of the old range days in Southern Alberta.

It was the cowboy who conquered the west—more than the prospector and the settler. It was the cowboy who formed the frontiers on the prairies, who brought the cows to Alberta, who built up the great industry and made the way for settlers and civilization. The story of cowboy life in Alberta 50 years ago was a glamorous one.

From the breeding grounds of Texas to the lush grass plains of Alberta is a long journey—months and months of weary travelling—and from Texas to Canada, like a lariat thrown idly on the ground, the 'long trail' twisted its way, the braidings of 100 trails or more. It lay like a vast rope connecting the cattle country of the United States southwest with that of the north. Loose and coiling, the 'long trail' ran for more than 2,000 miles along the east edge of the Rockies, sometimes skirting the foothills and sometimes hundreds of miles away across the flowered prairie.

Even today may be traced this old trail's first beginnings in the sandy wastes of old Mexico, whence the first Spanish longhorns strayed northward. It is still clear in Texas and the plow has not buried the furrows completely of its passing over the plains of Oklahoma. Right up over the 'Canada Line' into the land of the rolling hills and mountain valleys may still be found traces of the greatest of migratory roads in the world. History has no other like the unparalleled pathway of the 'long trail'.

The cowboy was fearless, courageous, loyal and restless with wanderlust urging him on and on. Quick to avenge an insult, to right a wrong, and to stand up for a partner, chivalric and elemental, he lived hard and often died with his boots on.

The early romantic history of Alberta is so closely interwoven with the range days that it seems right and proper that the events of that pioneer period should be recorded for posterity. Alberta people will always look back, with warmth of feeling tinged with a little longing, to that free, unrestricted era when the cowboy was king of the short grass plains in the foothills of the south.

In speaking of pamphlets, attached in the Appendix, is a most attractive one of the Plains Hotel, Cheyenne, Wyoming, compiled by the Hotel Company, with the assistance of the Wyoming Stock Growers' Association, which advertises some of the ranches in that vicinity, as well as adding to the novelty in advertising the hotel. The Association and the hotel companies appear to be missing an opportunity here by not following a similar idea. The ultimate consumer of the rancher's product, the general public, is interested in the romantic background from which that product emanates, but he will probably be more able to tell you of the background of "Dole" pineapples from Hawaii than of the "background" which surrounds his meat product. Interest of this nature can be a factor in consumer demand. The old saying of "advertise or perish" applies to the rancher as much as to the farmer. The ranching industry definitely needs more advertising.

HISTORY—A RECORD—ADVERTISING

Since the foregoing was written the stockmen, attending the 44th Annual Convention of the Western Stock Growers' Association at Calgary, have had the opportunity of hearing an address by Mr. R. L. Wright, Toronto, Director of Research and Statistics of Messrs. J. J. Gibbons Ltd., National Advertising Agency in Canada.

Mr. Wright is quoted as follows:

Provided the proper story of Alberta beef is told, in the proper way for the proper length of time, the producers stand to greatly increase their domestic market.

In fact, if the per capita consumption in Canada were increased only one-tenth of a pound each week it would provide for the production of an additional 67,000,000 each year.

The term 'co-operative effort' meant an advertising appeal financed by contributions of those engaged in the industry, on some equal basis, regardless of the fact that such contributors may be competitors of one another in their respective lines of business.

He urged the growers to constantly improve on the high quality already apparent in cattle by using the most modern methods of scientific feeding and to impress upon the public the wisdom of buying beef by grade.

At the same time he warned that actual organization of a co-operative campaign to stimulate consumption is one of the most complex pieces of planning that can be undertaken. He then outlined some of the essentials to be considered "if the best

possible results are to be expected or attained." In this the word "Co-operation" was stressed time and again.*

Mr. Wright's address has served to stress what has been previously written by the Appraiser upon the question of advertising and its real importance, which perhaps the stockmen here have too long overlooked.

His address has served to further stress what Mr. E. Warren of the Wyoming Stock Growers stated in his address to the Colorado Association last year, which has been quoted in full in this Report, namely, "That the last era was one of 'Corporations' while this one must be of 'Co-operation'". (See Appendix C).

The Appraiser leaves this phase of the question, with perhaps some phases of it settled in the stockman's mind, which should have a bearing upon his costs of production and markets for his products.

HISTORY—RANCHING

It would be impossible within the scope of this investigation to cover the entire history of Southern Alberta and the cattle industry. The following article from the files of the "Lethbridge Herald" of July 11th, 1935, issue, "Jubilee Edition," will, however, cover some of the history of a large number of existing ranches in the short grass area. A part of the article is quoted, as follows, which will give the reader some idea of the historical background of the industry.

It is not easy to find an early-day rancher whose memory is keen enough to remember those early days back in 1885 when the Fort Whoop-up and Fort Kipp districts were beginning to prove that the short grass country, the original summer stamping ground of the buffalo, is a natural cattle ranching country, and when young men, full of ambition, were anxious to establish a 'spread' of their own. The writer, however, was fortunate enough a few Sundays ago to spend a couple of hours with David J. Whitney, who came to South Alberta in 1882, and who, after a couple of years in various kinds of jobs then available, settled down to ranching, buying cattle off O. S. 'Hod' Main of Teton area, Montana, and established the Hat brand for cattle and horses, left ribs. Years later, Mr. Whitney sold out his ranching interest to the late J. H. Wallace who, with Walter Ross, ranged in a large way in southeastern Alberta, running thousands of head of cattle on hundreds of thousands of acres of lease. With the sale went the Hat brand.

Mr. Whitney and the writer with the aid of an old brand book of the vintage of 1900 were able to recall many of the famous old cattlemen who made South Alberta the greatest cattle ranching area of Canada. Some whose names are deserving of mention are, it is feared, overlooked, but the Old Timers especially are asked to forgive the failure of memory which had to cast back more than half a century to the beginning of things in the rolling foothills and endless plains about what is now Lethbridge. This story is a companion-piece to the more pretentious story in this issue from the pen of Fred

*Address, Mr. R. L. Wright, Director of Research and Statistics, Messrs. J. J. Gibbons Ltd., Toronto, 44th Convention, Western Stock Growers' Association, Calgary, Alberta, reproduced from the "Calgary Herald", Friday, June 14th, 1940.

W. Ings of Nanton, who rode in his first round-up in the Mosquito Creek-High River country in 1883 and who, with his brother, established the famous O H brand.

The writer is also indebted to Walter Huckvale of Medicine Hat, veteran ranchman of the Fort Kipp country in 1883 to the early nineties, for considerable information in this story. Those who furnished the material, and the writer, crave your pardon if all the facts are not here, and if some of them do not jibe with the reader's conception of early-day ranching.

HOW RANCHING STARTED

Indians—buffalo—N.W.M. Police—ranchers. That in general, is the sequence which brought ranching to South Alberta. In the early days before the white man came the Indians had an unfailing source of sustenance—the buffalo. Then the white man came along, the traders and the hide hunters. Buffalo were slaughtered by millions in the years between 1865 and 1880. The late George Houk, who is supposed to have come to South Alberta first in 1864 with the traders and buffalo hide hunters, has told the writer of seeing buffalo migrating for days on end, much as the caribou do now in the North West Territories to the north of Alberta. But by the middle seventies the buffalo were thinning out so badly that the Indians began to grow anxious and restless. Their staple food supply was disappearing. In 1873 reports from the West to Ottawa on the condition of the Indians, and the menace they were in, presented a half-starved condition to the white settlements, and caused the formation of the North West Mounted Police. In 1874 came the famous trek to establish Fort Macleod, the first N.W.M.P. post in Western Canada. In 1875 followed the establishment of Fort Walsh in the Cypress Hills and Fort Calgary, together with outlying posts. In 1876 came the signing of the treaties with the Cree Indians in the Saskatchewan-Assiniboia territory. In 1877 the Blackfeet Crossing treaty was signed with the Indians in South Alberta, placing the Blackfeet, Bloods, Peigans and Stoney on reserves.

But without buffalo the Indians had to have other means of sustenance, and the Police were given the task of looking after this important matter in co-operation with the Indian Department which had been organized at Ottawa. Cattle naturally took the place of buffalo, and the Indians were assured rations of beef until such time as they could establish themselves in agricultural and pastoral pursuits, raising grain and cattle for their own use on their own reserves.

Here in South Alberta, a contract was entered into between the government and I. G. Baker Company, traders and ranchers of the Missouri River country in Montana, to furnish the beef rations. The I. G. Baker Co., with St. Louis money behind it, and with a large trading establishment at Fort Benton, head of navigation on the Missouri River, in Montana, was engaged in ranching in the border state. Cattle were run across into South Alberta, butchered and the meat went to the Indians to fulfil the contract with the Indian Department. The I. G. Baker Co. established a trading post at Fort Macleod, and later at Lethbridge, Norman T. Macleod of Lethbridge, being manager of the Lethbridge store which was later sold to the Hudson's Bay Co. The I. G. Baker Co. also engaged in ranching in South Alberta as an off-shoot to its Montana ranch activities, and its brand 3 was one of the earliest in this part of Alberta.

POLICE GO RANCHING

What more natural than that the full-blooded young men who had signed up with the Police should, when their term of enlistment was up, start ranching on their own. And that is what happened, and that is how many of the early brands found their way to the ranges of South Alberta. Naturally the young ranchers established in the country they knew best, around Macleod, around Calgary and around Fort Walsh. And so we have South Alberta 'the cradle of Western Canada's ranching industry.'

W. D. 'Curley' Whitney enlisted from Kingston in 1877, and served with Mounted Police at Macleod for three years. After his enlistment was up in 1880 he ran a blacksmith shop at Macleod for a time, got out lumber for the police saw-mill near Pincher Creek on the south fork of the Oldman River, and then, with Jim Daly, another ex-policeman, started a ranch northwest of Macleod in the foothills. Their brand was the campstool. Curley Whitney's exploits stirred the imaginations of his younger brother and of several other boys in Kingston, Ont. district, and they came flocking to Fort Macleod. We have told you how his brother D. J. established the Hat brand with Hod Main cattle.

HOD MAIN

Hod Main was a partner in the Main and Dennis outfit of the Teton and Marias River country in Montana, who used to drift cattle across the line to sell to the new ranchers. Hod Main established a headquarters on this side of the line, running cattle around Kipp and north of the Blood Reserve. He was a great friend of old Camoose Taylor who ran a stopping place in Macleod. He was married to a squaw. About 1883 Main sold his headquarters near Fort Kipp to Walter Huckvale, a young Englishman, and then Main moved to the Little Bow country. Main had a Montana brand.

Walter Huckvale established the 'Fiddle Back' brand in the Kipp country and we there for nine or ten years before moving to the southeast country with Syd Hooper. He developed a very fine ranch along Manyberries Creek, ranching there until 1916 when he sold out and retired to Medicine Hat where he still lives.

Al Whitney, who came in 1881, bought cattle from Hod Main, and established his own 'spread' in 1885 near Kipp and Rocky Coulee and his brand was the shipwheel.

Bill Long and Dick Urch came from England in 1883. They kept a 'half-way house' at the 'Old Crossing' of the Oldman River just southeast of the present Monarch. This is where the stage coaches crossed the river for years on the Macleod-Lethbridge run.

FROM TEXAS

George William Rowe came to this country from Texas, via Fort Benton. For a number of years he traded with the Indians in the Cypress Hills, but when the Police came along he moved to Fort Macleod where he established a freighting business running a line between Fort Benton and Fort Macleod. Later he engaged in ranching in the Snake Valley country near where Lomod is now located, and ran the D3C brand. He sold out about 1903, coming to Lethbridge and establishing the Dallas Hotel which his son George Rowe, president of the

Lethbridge Fair Board in 1934, now operates. Mr. Rowe died about 25 years ago, but Mrs. Rowe is still living on the Pacific coast.

One of the big outfits east of Lethbridge was established by Hon. Archie McLean in 1885. Mr. McLean had associated with him the Winnipeg interests of Osler, Hammond and Nanton. Their headquarters were on the South Saskatchewan north of where Grassy Lake now stands, just about where the Oldman and the Bow River come together at the Grand Forks. Mr. Ings tells of the Cy ranch operated by Mr. McLean in his story of Alberta ranchers.

THE CIRCLE OUTFIT

While the country nearer the foothills, where there were many streams and springs, was given over mostly to the smaller ranchers, the farther east, and the more scarce water became the bigger the ranches. The Circle Ranching Company owned by the Conrad brothers, who had large ranching interests in Montana, established a big outfit on this side of the line, running cattle all the way from the Bow River south to the boundary.

Howell Harris*, who lived in Lethbridge for years, was manager. He died a few years ago at Fort Benton, Mont. Their brand, of course, was the circle, with a 3 above, and their cattle were spread over such a wide area that they had representatives, 'reps', in all the round-ups north, southeast and in Montana. Jim Fuller, who later bought the Hod Main ranch which the latter established near Queenstown, east of Vulcan, used to ride for the Circle. Before that Jim Fuller had got together a Wild West Show somewhat after the style of the Buffalo Bill show of youthful memory. Baldy Buck was the last foreman of the Circle outfit, following Jim Townsend, and is now living in Great Falls. No 'circle' cattle have been running in South Alberta since about 1910 when farms took the place of the range.

The first ranch east of Lethbridge in the Medicine Hat country was not established till 1883. Ezra Pearson, who freighted to Lethbridge and Macleod after the steel reached Medicine Hat, set up a ranch on Seven Persons Creek, the 7 bar 7. Later he organized the Medicine Hat Ranch Co. with the MHR brand, and this is still one of the big ranch outfits of the Medicine Hat country today, though it has changed hands.

Jim Pierce came in from Fort Benton, Mont. about 1886, and started ranching, with headquarters on the river bottom north of Lethbridge, just below No. 6 mine. His horse brand was P, and his cattle brand was JP, and that particular part of the river valley was known as Pierce Bottom. Later he moved to the Pothole, and still later went to the Brooks country.

WALTER ROSS

A few years ago the people of Alberta used to talk about the 'Big Four' of Alberta ranching. These were Pat Burns, A. E. Cross, George Lane, and Hon. Archie McLean. With the turn of the century entered a new figure who loomed largely for many years. This was Walter Ross of Lethbridge, whose activities have been taken over by his son George, Alberta's 'flying rancher', the name given to him because he pilots his own plane. Walter Ross built railways in his younger days.

*It will be noted that a nephew of the late Howell Harris and namesake is quoted in the Appraiser's Montana investigations.

Early he went to Texas, and carried the steel of the Southern Pacific into San Antonio. When the Canadian Pacific was building through the West to link the Atlantic and Pacific, he had a number of contracts. In 1885 he came to Calgary after the Rebellion had been cleaned up, and drove from there to Macleod and on south to Cardston. The big Texas ranches of hundreds of thousands of acres had fired his imagination when he was building railroads there, and he liked the idea of becoming an Alberta rancher. Seven miles north of Cardston, on the St. Mary River near the present village of Raley, he acquired land, and established Tom Brown as manager of the Brown Ranching Co., which Mr. Ross and a couple of associates formed. The Brown ranch was for years a landmark in the Cardston country. Wm. Oliver, then a young contractor in Lethbridge, built the first house on the Brown ranch. It was equipped with running water and even a bathroom. In 1908, Dr. A. G. Robertson, a McGill graduate, came from Sandy, Utah, where he had practised for many years, and bought the Brown Ranch headquarters and 5,000 acres east of the River across from the Blood Reserve. Mr. Ross, after buying the ranch had left to do more railway building in those days when new lines were being projected into all parts of the West, and did not return to stay until the turn of the century. He then took over active management of his property. Their cattle brand was BR. Mr. Brown had established the wineglass brand for horses. Mr. Ross sought wider ranges and turned his eyes along the Milk River country in the southeast.

JIM WALLACE

In the meantime, J. H. 'Jim' Wallace and brothers Steve and Bob had come along near the end of the century, driving a bunch of cattle from Oregon across the mountains and north through Montana, entering Alberta at Whiskey Gap, south of Cardston. Jim Wallace built a log house near the boundary and started up his outfit, working with the Ross and Brown outfit in the round-up. He too looked to the southeast and began running cattle out towards the Cypress and Sweet Grass Hills. Eventually towards the end of the first decade of the present century, Jim Wallace and Walter Ross threw in together and became one of the really big outfits in Southern Alberta. They controlled half a million acres of lease in South Alberta and southwestern Saskatchewan. The Lethbridge-Weyburn branch of the C.P.R. crossed their lease and they had their own loading station. At one time it was said they were offered nearly a million dollars for their cattle. They shipped cattle on both sides of the line to the Chicago and other U.S. markets, and during the war got tremendous prices. Their calf crop yearly ran into the thousands of head. The bad winter of 1919-20 and the post-war slump in cattle prices which came in the same year, caught them. Eventually they split up the partnership, and Mr. Wallace died not many years after. Mr. Ross turned over the active management of the ranch to his son. A smaller number of cattle were run and some of the big leases were dropped. Today George Ross has some 28 miles of waterfront range along the Milk River in the St. Kilda district east of the town of Milk River. Mack Higdon, the Gilchrist Brothers and a number of others in the extreme southeast of Alberta now are ranching on former Wallace and Ross leases.

In those palmy days before and at the beginning of the war, there were a number of fine ranches in the southeast of

Alberta, mostly owned by men who made Medicine Hat their headquarters. We have told about Hooper and Huckvale along Manyberries Creek. There were the Mitchells of Medicine Hat, and two sons, Johnny and Jim, are now operating the old LA brand. J. H. Spencer of Medicine Hat also ran an outfit with the PS brand, while the Spencer Bros. had the L5L outfit east of Coutts.

TONY DAY

One of the famous Medicine Hat ranches was the Tony Day outfit. A. J. Day came from Texas, and at one time he ran some 10,000 head of cattle in the Medicine Hat country. Thousands of head were lost in the hard winter of 1906-07. A son, A. C. Day, carried on ranching at Medicine Hat for some years later, and in 1918 was associated with Ray Knight of Lethbridge in staging the Knight and Day stampede at the Lethbridge fair. The Day brand was a reverse F on a 'northwest-southwest slant'. The Jas. Hargrave family is one of the oldest in Medicine Hat. Mr. Hargrave was a rancher who ran cattle under JH and JHA monogram brands. The Hargrave and Sissons outfit operated in the Walsh district in the Cypress Hills with the S iron on their cattle. When vented this brand made the dollar sign. Col. F. O. Sissons was the active head of the ranching partnership.

Back before 1900 the Stapleton Bros. ran cattle with the cotterpin 4 iron, in the Macleod district. One of them is still ranching near Empress on the Red Deer river north of Medicine Hat.

The old brand book also tells us that John D. Beatty and Sons ranched in the Sand Hills near Walsh in the southeast country, running 5R cattle. Alex. Middleton with Dunmore as his address ran cattle with an inverted 73 brand, quarter circle under. The Canadian Land and Ranch Co. Ltd. claimed the Cypress Hills range, and ran cattle branded 76 on the left rump. D. H. Andrews was the manager. The Maple Creek and Medicine Hat ranchers seemed to be a clan of their own, and were more closely associated than with ranchers in the Lethbridge, Macleod or Calgary areas. Dixon Bros., John and Chester, were among the earliest ranchers and merchants of the Maple Creek country, and ran cattle under half a dozen brands including T5 and L-J, with DB the horse brand. Dr. Dixon, range veterinarian and rancher in the southeast country, is a son of the Chester Dixon family. Mrs. S. J. Shepherd of Lethbridge is a daughter of John Dixon.

Harry L. Tweed of Medicine Hat was another who was interested in ranching. He was the city's first merchant. He ran the H5X brand.

Swinging northeast from Medicine Hat, the Gleichen country was at one time one of the greatest range cattle areas. Here Gordon, Ironsides and Fares, who later ran some 10,000 head on the Blood Reserve with Mr. Nash as foreman, ran their two bar quarter circle herd in the Wintering Hills. E. A. Wyndham ran cattle with the chair brand. John Clark, Jr., also ran cattle at Gleichen under the JC brand. John Dafoe was in this range with A9 cattle and Lazy S bar horses.

PADDY HASSEN

Getting closer to the home range once more, we learn that Paddy Hassen, a name to conjure with in the old days, was a horse rancher of note, who sold many head to the Mounted

Police in the early days of the force. He was an Indian trader in the earlier days. Later he settled along the Pothole where the George Russell place now is. He ran about 1,000 head of horses in the Blood Reserve-Kipp Coulee range and in the Sweet Grass Hills. Paddy had been educated for the priesthood but had turned to trading and ranching. His brand was EH.

Sandy McNab ranched on the river north of the Dave Akers place at Fort Whoop-up. His brand was the A. He was one of the real old timers.

Bill Fixley was another rancher in the immediate vicinity of Lethbridge. He rode for Hod Main, but eventually started for himself across the Little Bow. He sold out to the Circle, and came to the Eight Mile Lake range. His brand was the bridle bit.

Two Lethbridge boys, W. H. and L. S. Ripley, sons of Robert Ripley, former Homestead Inspector, ranched on the Little Bow northeast of the city. They ran a Lazy Y brand that looked like a downeast bootjack, on their horses, and their cattle brand was 5PU.

KNIGHTS AND MCINTYRE

One of the big outfits established just after the turn of the century was the Knight Sugar Co. Interested in South Alberta by C. A. Magrath of the Alberta Railway and Irrigation Co., Jesse Knight, a wealthy Utah miner and rancher, came to South Alberta and within a couple of years had purchased more than a hundred thousand acres of land, some of it on the Ridge just east of Cardston, and some south of Raymond. His son, Raymond Knight, accompanied him, and the town of Raymond was named after him. They established some 6,000 cattle and 54,000 sheep on their range land, this being one of the first big sheep ranches in South Alberta, now the leading sheep ranching area in Canada with some 3,000,000 head of range sheep recorded. The Knights ran the Bar K2 and the K2 bars brands on their cattle. The Knight ranch is still a big institution in the country south of Raymond.

The McIntyre ranch, south of Magrath on the Milk River Ridge, is another of the big spreads in the south. It was not one of the earliest ranches. W. H. 'Billy' McIntyre is now the owner. It was established in 1895 by his father William H. McIntyre of Salt Lake City, who bought three townships of land, making nearly 140,000 acres in a block bordering on the U.S. boundary and watered by the Milk River. The lease was homesteaded back about 1912 and some of the freehold land was sold in 1917 and 1918, but the McIntyre ranch still consists of 50,000 acres of the finest range land in South Alberta, all freehold property. The cattle brand is the IHL iron. The McIntyre herd of Herefords is one of the finest in Canada. Many of the animals are purebreds, and McIntyre carlot steers have on numerous occasions carried off the firsts at Toronto Royal. McIntyre bulls are always in demand, having also won widely at Chicago International and Toronto Royal.

BACK HOME AGAIN

Johnny Wright is another colourful old-time South Alberta rancher who will meet many former range men during the Jubilee. Mr. Wright came to this country from Missouri in the eighties. He rode for a while at Pincher Creek, and then for the Circle on the Little Bow. When the Circle sold out

he established his own ranch in the Little Bow country. Today he is ranching on the Oldman River south of Monarch, his buildings being along the highway near the traffic bridge there.

This story is a lot like Tennyson's Brook. It threatens to run on forever. Unfortunately we cannot mention all the men and all the brands who made ranching Southern Alberta's top industry until wheat raising superseded it, starting in earnest about 1906. We have ambled across South Alberta and back again, around Lethbridge and around again. We have referred to that brand book a thousand times. There must be 50,000 brands in it. The names of Lethbridge, Medicine Hat, Walsh, Maple Creek, Gleichen, Macleod, Coutts, Cardston, Pincher Creek, Cowley, Nanton, High River, Millarville, Calgary, Cochrane, appear so often that one gets lost in its mazes. It is one of the most interesting books that we have seen. It is a link with the past, and an invaluable record. We hope that the Lethbridge Historical Society can get a copy for the city's archives.

We would like to go on mentioning those old names for to the Old Timers each name must recall a tale. We have tried to cover the highlights of those old ranching days; we know that we have overlooked some who played a big part in the development, but we hope that in the reading of this you will have caught something of the colour and glamour of those days following the disappearance of the buffalo; those carefree days which caused young men to leave home and lay the foundations of a new empire in the West.

BRAND BOOK

The old brand book referred to, besides being a real historical document, was a most essential part of the business in its assistance in the protection of the industry from loss by stock rustlers.

The revision of the present brand book by the Provincial Department of Agriculture in 1937, which has jurisdiction over the recording of brands, filled a long felt need of the industry in its assistance to the stockmen and the Royal Canadian Mounted Police, whose duty it is to protect the ranchers' stock from theft by rustlers—using in this protection the modern method of trucks, etc. The R.C.M.P. are to be commended for their work in this regard which is fully appreciated by the stockmen.

The Appraiser further suggests that the associations get in touch with the Oregon Stock Growers' Association and the Oregon State Police at Salem, Oregon, with regard to an Act which they have in that State covering stock rustling activities, and the methods of co-operation worked out between the stockmen, the Association, and the State Police. This enactment has greatly curbed stock rustling activities in that State with the help of car and truck, and a similar one might be of great assistance to the R.C.M.P. in their efforts here. It would facilitate the work of their stock detectives to the further benefit of the stockmen.

So much for the history of the Alberta range. It is a history which is interwoven with the governmental regulations of the industry.

HISTORY—GOVERNMENT REGULATIONS

In dealing with the historical background it is necessary to study some of the changes in government regulations in order to see their present effects upon the ranching industry of the short grass area. In this connection, the following very able article, prepared on this subject by a research official of the Dominion Department of Agriculture, is quoted in its entirety.

TRENDS IN SECURITY OF TENURE OF GRAZING LANDS IN WESTERN CANADA

By JOHN PROSKIE

Economics Division, Marketing Service, Dominion Department of Agriculture.

[Editor's Note.—The ranching industry, over a long period, has been subject to varying periods of instability. One of the chief causes for this has been and is the uncertainty of tenure of grazing lands. The following article is therefore both timely and of importance. All material in quotations are taken from files of Dominion Orders in Council, 1880-1931.]

Grazing of livestock is still a large industry in Western Canada. Measured in terms of acres there are at present in the three prairie provinces 1,578,918 acres of improved pastures and 33,731,037 acres of natural or prairie pasture. Much of our western agricultural wealth is invested in live stock that harvest the forage produced on 35,309,955 acres, year in and year out. Besides this, in Alberta alone, 145,339 head of cattle, 20,586 head of horses and 34,358 head of sheep utilized the forage in the forest reserves for a part of the year 1938, while in British Columbia public lands provided forage for 72,800 head of cattle, 2,248 head of horses and 37,060 head of sheep.

All of the grazing land in Western Canada before 1880 was free for the taking and much of it was free for a long while after that date. Today these grazing lands have a great intrinsic value and add much to the national wealth of Canada. A large percentage of our population depends, directly or indirectly, on the range lands for their livelihood. Again, these range lands produce meat products year after year that not only supply the Canadian demands but also the demands of the export trade.

The importance of the range lands was brought to light by the pioneer cattlemen whose only cost of production was the loss in cattle, labour and transportation. At present the use of these range lands is carried on by ranchers and stockmen who have had to watch their costs increase as the years rolled on, increase by land investment, increase by costs of fencing and increase by the necessity of growing feed which has meant heavy investments in equipment, labour and fixed improvements such as irrigation. The length of tenure and lease costs have played no small part in these growing costs and many times the very existence of this important industry has been threatened by insecurity of tenure, as well as by the ever increasing cost of land.

The history of ranching in Western Canada has been shaped by tenure of leases and their cost. This history may be divided into periods, based on changes in tenure, as follows: (1) The period of free grass; (2) The period of leased range; (3) The period of private ownership; (4) The period of public acquisition.

PERIOD OF FREE GRASS

The pastoral stage of grazing the country followed closely on the retreating steps of the Indian and the white hunters and

of the vanishing buffalo, which were the first members of the cattle family to graze on the Western Ranges. Keen observations of the possibilities of the grazing industry attracted outside capital and these pioneer graziers moved in to harvest an abundant forage produced by nature in an unrestricted manner. Their rights were protected by the law of the open range, "first come, first served", and when one area was "eaten out" one could easily move to a new location. Under the system of open range and free grass it was possible, in a very short time, to make very large profits since there were no land charges to be met. However, this form of successful pastoral agriculture drew to the attention of the Dominion Government the fact that "the easterly base and slopes of the Rocky Mountains is said to offer unusual facilities in the way of both shelter and pasturage, cattle being able to subsist in the open air during the spring." Accordingly Orders in Council in 1880 provided for leasing of grazing lands at a nominal rate of one cent an acre.

However, competition was invited, for when two or more parties were seeking to lease the same land tenders were asked in addition to the rental and the lease was granted to the party offering the largest premium, as well as the usual rate.

Security of tenure was provided for by the granting of twenty-one year leases. It was thought that this would assist in stimulating the investment of capital into the ranching industry. In addition the lessee was to stock at the rate of one head of cattle to every ten acres of land embraced in the lease within three years, and this proportion was to be maintained throughout the life of the lease. This meant that a holder of a 100,000 acre lease would have to invest in cattle alone between \$400,000 and \$500,000 within three years of the granting of the lease. To insure further permanency an option of purchasing land within the leasehold, at \$2.00 an acre cash, for farm corrals, etc., was also granted after the other conditions had been fulfilled.

As early as 1883 there was evidence of agitation for the abandonment of the system of leasing and the cancellation of the then existing leases. As a reply to the agitation it was pointed out that the tenure of the grazing lands was a mere leasehold terminable upon two years' notice. In spite of this apparent insecurity, by 1884 the Cochrane, Halifax, Oxley, Walrond Ranch Company and others secured leaseholdings of about 100,000 acres each, making a total of 47 leases embracing some 1,785,000 acres, and began stocking the ranges as required.

The security of tenure of lease, subject to two years' notice, was short lived and completely abolished when an Order in Council in 1885 amended the "two year" clause, making the lands under lease immediately available for homesteading and pre-emption for prospective settlers or purchasers. By the same Order in Council the rental for grazing lands was increased to two cents per acre, which increase was explained away as follows:

The yearly rental of one cent per acre, or, as the regulations have it, \$10.00 for each 1,000 acres, was fixed by the Governor in Council at a time when it was thought desirable to offer every inducement to stockholders to test the capabilities of our grazing country for the carrying on of the industry. "That our grazing lands and our climate are both superior in all material respects to those most in request on the south side of the 49th parallel has now been proven beyond dispute."

The ranchers were again faced with paying the increase in the lease cost or going out of business, in either case taking a heavy loss in their investments.

The doubt which had been created in the minds of many leaseholders by 1885 as to whether they were likely to receive the protection of tenure under their leases which they had at first expected, had become a reality when in 1886 "all grazing leases were subject, so far as the even numbered sections within them were concerned, to be withdrawn from the operation of the lease when applied for homestead or pre-emption purposes."

The year 1887 marked another period of increased costs. By an Order in Council, provisions were made whereby grazing lands could be granted only after public competition but exceptions were provided for the actual settlers who could lease without public competition a tract of land adjacent to their homesteads not exceeding four sections. This was followed by an Order in Council in 1888 which amended the grazing regulations "so as not to permit a lessee of grazing lands to homestead lands within any tract leased to another for grazing purposes." This latter amendment was evidently for the purpose of protecting one lessee against another. By these same Orders in Council provision was made "to place one head for every twenty acres" upon the leasehold, instead of "one head for each ten acres" for it was realized that the grazing lands were not as productive as was originally anticipated.

TRENDS IN GRAZING TENURE

An area of 140,000 acres was reserved as stock-watering and shelter reservations in southern Alberta by 1896, although the estimated total area of grazing in southern Alberta was put at 17,438,210 acres. This reservation insured access to some of the grazing area and no discrimination was made against the settler. For, as it was pointed out, "The large stockmen never had any objection to settlement, if the settlers would only lease access to all the winter grazing, shelter and water for livestock essential to their welfare, in fact to the very existence of all."

In 1901 there was some tightening up on lease rental delinquents, when an Order in Council provided "that in case payment of the rental of a grazing lease is not made within 90 days from the date upon which it became due a penalty of fifteen per cent may be added." The Orders in Council of the same year also provided for the regulations of the hay and grazing lands in the Yukon Territory. These regulations permitted the granting of grazing leases for a term not exceeding ten years at a rental of \$100 per square mile and for the issue of the hay lands for a like period at an annual rental of fifty cents an acre and the issue of permits to cut hay at the rate of three dollars per ton. About this time there was a great influx of ranchers from other parts of the Dominion and the United States and in nearly all cases these parties applied for leases.

The ranchers were moving further and further back; and the settlers were taking their places. By 1905 breaking up of the prairie appeared on all sides. In 1906 alone there were 41,869 entries for homesteads. In June, 1906, the ranchers were again forced to purchase stock-watering reserve lands in order to protect themselves. The land was put on the auction block at Calgary, High River, Pincher Creek, Macleod, Lethbridge and Medicine Hat. The sales were well attended and competition was keen; the prices ranged from \$3 to \$16.50 per acre.

By the end of 1906 seventy-five per cent of the land available for purchase at Pincher Creek had been purchased and occupied.

As a compensation for the contraction of the grazing areas available to the ranchers, the Orders in Council in 1908 provided, "whereby a lessee of grazing may be granted permission to

cultivate and crop such a portion of his leasehold as may be considered necessary for the growing of fodder for his stock." It was thought that this would provide the ranchers with reserve feed and make it possible to maintain a greater number of cattle on a given area. In other words, the ranching enterprises were using their land intensively but at a higher cost.

More and more land was being released by the ranchers to the ever growing number of settlers and by 1910 the granting of grazing leases was confined to the southern portion of the Province of Alberta, southwestern Saskatchewan and the railway belt in British Columbia. Further, leases in these districts were granted only for such lands as were reported by the inspector of ranches after inspection "to be unfit for agricultural purposes," and by 1913 the ranchers realized the necessity of leasing all available rough land for grazing if they were to remain in business. Thus the rancher was pushed back further and further, relinquishing his lands, as the plough appeared over the horizon. In 1913, there were 18,963,200 acres under field crops which produced 500,876,500 bushels of grain. Population, on the other hand, had been increased by 1,225,478 immigrants during the period 1900-1913. It seemed indeed that the day of the rancher was over. But the ranchers took up the fight and in 1913 a grazing commission was appointed to investigate the whole ranching industry in Western Canada. As a result of this investigation, new regulations were put into force in 1914, "whereby grazing leases could be secured of any unoccupied lands unsuitable for agricultural purposes situated at any point in the provinces of Manitoba, Saskatchewan and Alberta and in the Peace River Tract in the Province of British Columbia." The leases now granted gave a greater degree of permanency, since the withdrawal for homestead of any of the lands now offered was prohibited for a period of ten years.

With the increased permanency of the leases, ranchers again started to build up their herds by protecting their female stock. The ranchers now felt secure. They began to renew their leases under new regulations and once more the stockmen entered into the stock business with zeal and energy. But this was to be short-lived, for the exceptional crop of 1915 made the "granting of leases for grazing purposes more difficult since a lot of land that had been looked upon as worthless for cropping purposes was now being entered for that purpose."

The dry years of 1918 and 1919, together with the encroachment of settlement, gave great impetus to irrigation and as the dry land farming operators encroached on the range, many stockmen sank thousands of dollars into their land in order to ensure feed and fodder for the cattle. But that was not all, because in the face of scarcer and scarcer range the rentals on school lands were increased from four to ten cents per acre in the provinces of Saskatchewan and Alberta and from six to ten cents per acre in the Province of Manitoba. The only alternative to the payment of the increasing lease costs was the complete cessation of business.

The next important change came in 1925 when grazing regulations were established again for the granting of twenty-one year leases. This provided for greater permanency of tenure and a decided impetus was again given to the stock-raising industry. But over the horizon appeared another change and once more the ranchers wondered how they would fare under unknown regulations.

Orders in Council in 1930 transferred all of the natural resources of the respective provinces and provincial regulations

governing the grazing lands followed shortly. By 1932 the Dominion Government administered only 66,678 acres of grazing held in lease in the Military Remount and Training Ground in the Province of Alberta and the grazing privileges on Quarantine reserves in connection with grazing permits, covering 28,800 acres. Thus closed the last chapter of the administration of the grazing lands in the west for five decades by the Dominion Government. The graziers were forced to deal with new administrators and wondered how this change in administration was going to affect them. However, the years following 1930 were very dry and the grass disappeared very quickly, in fact, it seemed almost to vanish while the prices fell lower and lower and the stockmen pushed more and more stock on the ranges in an effort to decrease the ever-mounting unit costs. Both ranchers and the administrators were faced with new and colossal problems which needed to be solved; drastic changes had to be made. In this manner the ranching industry entered into an era of public acquisition and control.

PERIOD OF PUBLIC ACQUISITION

The rancher, in order to retain some control of the land he used in his business and to assure himself of permanency of tenure, had had, in the past, to pay and pay heavily; in purchasing land at exorbitant prices, and in heavy improvements of leased land in fencing and water developments which were completely lost when land was thrown open for homesteading. Now the rancher realized that his security was in the grass and not in the land; acres were meaningless when denuded of succulent forage. A great number of the ranchers found themselves with large areas of land but little or no grass. In the face of this they could not meet the lease costs and consequently many leases became delinquent with little hope of ever returning to the status of a paid up lease holder. On the other hand, it became evident to the administrators, the ranchers and the many dry land farmers that the abandoned cropland was a problem of the range, and many lands had been ruined by the plough for grazing purposes for 30 and 40 years and some of them forever. The problem of the dry land areas became a national one and in 1935 the Dominion Government, through The Prairie Farm Rehabilitation Act, took steps to rehabilitate the range and the cropland in the dry areas of the West. Much constructive work has already been done; regrassing has done much to reclaim much of the abandoned cropland and is slowly putting this class of land again into grazing. On the other hand, the water development has tended to increase and raise the productivity of many range lands. The Provincial Departments have also taken steps to lessen the burden of the rancher; in some cases substantial reduction in tax arrears are being made. A reduction and adjustment in the rental is also being made. Today permanency of the leaseholdings are again under warm discussion and many ranchers and stockmen again wonder how they will fare in the future.*

From the foregoing article can be readily seen the periods of uncertainty through which the industry has passed, and that as a result of the Homestead and other related Acts, the checker board effect that has resulted in the land which the rancher formerly controlled. If he were to continue to control it as an industry demanding stability in order to survive, for it is a

*"Canadian Cattleman", June, 1939.

life time occupation, it became necessary for him to purchase some of the abandoned homesteads, in order to consolidate his ranch. A large portion of his capital in the past had, of necessity, to be frozen in land purchases. In the majority of cases these had been at land boom prices, such land in many cases controlling good water, etc. The land had fetched land boom prices even though unsuitable for farming over a long period of years, for the homesteader demanded such as his price for moving on. Tenure, assured over a long term, alone gives stability to the industry of ranching.

In connection with some of the problems of the stockmen in the past, the following clippings from the "Calgary Herald" of May, 1910 should be of interest:—

A new map of the provinces of Alberta, Saskatchewan, and Manitoba has just been issued which shows in colours the homestead and other lands disposed of by the Government to January 1st. The three provinces contain 334,894,320 acres, of which 145,249,985 acres have been surveyed. Subsidies of 31,864,074 acres have been granted to railway companies, and homestead, pre-emption and purchased homestead entries have an area of 44,027,000 acres. The surveyed school lands endowment, 7,948,500 acres, and the grants to the Hudson's Bay Company, 6,565,000 acres, and the surveyed lands disposed of, including Manitoba Swamp lands, irrigation lands and half breed and military scrip, have an area of 11,490,000 acres.

—"Calgary Herald," May 7th, 1910.

Business all through the west was never better than it is this spring. There are many reasons to which the present prosperity may be attributed. The fact that there is a lot of capital coming into the country is one great advantage which the western provinces enjoy. But the amount of money which may come into a country will never assure its prosperity. It is what the country itself is capable of producing that eventually tells the story of provincial and national success.

The western provinces have been contributing in no small degree to their own welfare. A government return shows that of the 147,482,000 bushels of wheat which were produced on the prairie farms, all has been removed from the granaries with the exception of 26,682,000 bushels.

—"Calgary Herald," May 8th, 1910.

The big cattlemen of the province are again bringing the attention of the authorities to the serious menace to their industry through the cancellation of lease-holds. With the immense area of unsettled country which Alberta still has, it seems strange that there should not be some portion which could be left to the unrestricted ranging of cattle. It would mean splendid stockers for the smaller holders to finish during the winter seasons. It would mean splendid grass beef nourished on the luxuriant feed of the country.

—"Calgary Herald," May 20th, 1910.

The first shows the amount the Government had permitted to be homesteaded in the western provinces by that time, 1910, and the checker board that accompanied it with school lands, Hudson's Bay Company and railway lands, from which the stockman is still suffering in his debt structure whilst endeavouring to consolidate his holdings.

The second editorial points out some of the false prosperity which prevailed at that time as a result of the influx of new settlers with new capital, which in many areas has been entirely dissipated over the years, when they settled upon lands of the short grass prairies generally subject to inadequate rainfall.

The third editorial of May 20th, 1910, shows what was happening to the large rancher and even some of the smaller ones at that time, through the cancellation of their leases. It is interesting to contrast this with the State of Texas, which never permitted the cancellation of the entire holdings, but had and still has a minimum of ten sections, below which a lease cannot be cancelled, in the case of a going concern, to accommodate newcomers. This condition has had a lot to do with the stability, over a long period of time, of the ranching industry in the State of Texas. The editorial writer of the "Herald" foresaw, perhaps, what we have only recently discovered by "the trial and error method" of over thirty years, that there are some portions of this province suitable only for the range grazing of livestock, to be balanced by a system of agriculture in other parts.

HISTORY—OLD DOMINION RATES

Mr. Albert Helmer, the Appraiser's late Chief, in speaking, as Supervisor of Grazing, Dominion Department of the Interior, of the then existing rates of 2 cents per acre set by the Dominion on grazing lands in the West, used to state that this rate was originally based upon an arbitrary valuation of all western grazing lands at a value of 25 cents per acre with interest at the then prevailing rate of 8% per annum.

This is correct, as far as can be ascertained, on the presumption by the Dominion Government, that such valuation takes into account the uncertainty and hazards of the grazing business, and that such an amount and rate were fair and within the ability of the industry to pay.

In Mr. Proskie's article, however, it is shown that the Government had to revise its opinion, from a requirement of one head for ten acres to one head for twenty acres, in carrying capacity requirements, showing that such capacity even then was not equal to what a great many individuals in the East thought it was, based upon their experience in a more humid region.

HISTORY—GOVERNMENT REGULATIONS—DOMINION RATES

In the matter of school lands for which the Federal Government stands as trustee for the western provinces, the rate was 4 cents per acre, which, with the influx of settlers and the demand for more land, was increased to six cents in Alberta and Saskatchewan, creating added costs to the stockmen for these lands within their leaseholds.

The regulations of 1914, prohibiting homesteading within these leaseholds for a period of ten years, which by this time were mainly the poorer and rougher lands in the province, gave the stockmen a short breathing spell.

The period of stability, however, was short lived. The exceptionally wet year of 1915, followed by 1916, with high prices for wheat as a result of the war resulted in much land which was sub-marginal being broken up and put into crop, and more leaseholds were disintegrated, giving the industry another set-back.

The dry years of 1918-19 saw much land abandoned. Cultivation diminished and the rancher had difficulty in getting sufficient feed for his livestock.

The change in the regulations during 1925, providing for the issuance of twenty-one year leases, gave the industry some sense of security and many leases were renewed under the new regulations which permitted the stockman, because of the length of tenure provided, a full opportunity to plan his business properly in view of its long term trend.

The transfer of the natural resources to the provinces in 1930, however, was upsetting to the range, as somewhat new authorities had to be dealt with in the administration of these leases and new grazing regulations were enacted.

It should also be pointed out that when the provinces became taxing authorities, they evidently deemed it advisable to get as much as the Dominion and a rate of two cents per acre provincial tax was levied upon these lands in addition to the already existing Dominion two cents, making a total cost to the rancher of 4 cents per acre.

To show what also took place in the western States during the same period of time, and the problems left behind as a result of instability in regulations, the false premise in ignoring the climatic factor, the following article written by a keen and competent observer, will prove of interest.

Mr. James E. Poole of Chicago, one of the best known livestock marketing authorities in America, took a trip through the Western States in the fall of 1939, and these are his observations and comments:—

West of the Minnesota and Iowa line a transformation occurs. Dry farming has received another knockout blow. The country between the Black Hills and the Missouri River is in a bad way, between hoppers and aridity. Once an area where southern cattle were double-wintered and literally grazed on a thousand or more hills, a herd of steers is a novelty. Grass-hoppers' ravage has apparently entered a perennial period, defying human suppression energy. Certain agrarian benefactors conceived the idea of planting swales to sweet clover. Now it is claimed that these islands are hopper breeders, settlers burning and otherwise destroying the last vestige of vegetation. Tree belt enthusiasm has vanished with realization that trees are gross water feeders, possible only along water courses, which have gone dry.

VICTIM OF IGNORANCE

This entire short grass country is the victim of congressional ignorance; has been, in fact for half a century. Between overstocking and turning grass wrong side up in futile efforts to grow grain, destruction is evident over enormous areas. Settlers'

plows have exposed extensive areas of soil to wind erosion, the yellow subsoil cropping out. Deserted patches of plowed land, sod huts, stables, and corrals decorate the landscape. Standing out conspicuously as a favoured section is the noted "Sand Hills" of Nebraska, where cattle breeders continue on the even tenor of their way, raising maximum calf crops under intelligent methods annually and recalling what Teddy Roosevelt would have accomplished and the Kincaid Homestead Act, now forgotten, perpetuated had the aforesaid cattlemen not persisted. Crested wheatgrass saved the cattle industry thereabouts by furnishing spring and fall feed in abundance and arresting blowout development.

But the dry farmer is persistent. Given one or two favourable vegetation seasons he will return to his self-appointed task of destroying nature's aridity appeaser. Agricultural machinery makers have aggravated the case. Dr. Butler of Montana relates an incident, actual or merely illustrative, wherein a settler running a huge tractor and a multiple bottom plow was ripping up a grassy mesa when an Indian happened along.

"What do you think of that, chief?" he asked, pointing with pride to his accomplishment.

"Wrong side up," replied the redskin, laconically and prophetically.

About that time an exuberant youth arrived from Minneapolis announcing that he was selling agricultural machinery.

"Better go back before you run out of expense money," he was advised.

"I'm a salesman; just watch my smoke," was his retort.

Hiring a rig, he hopefully travelled into the hinterland the next day. To a discouraged settler sitting by a sod hut and gazing ruefully at a dry acreage where wheat sown the previous year had not sprouted, he disclosed his mission.

"Son, nothing I'd like to be able to buy now more than a binder but it ain't no use. You don't know this country."

Pointing to a cloud bank, the youth put on selling pressure.

"Look at those clouds. They will bring rain. Buy a reaper right now before we are sold out."

"Kid, I told you that you didn't know this country. They are empties returning from Iowa."

WARNING NOT HEEDED

But Congress, filled with easterners, refused to heed warning by experienced western livestock growers, who were stigmatized as free grass pirates intent on keeping the settler out of his heritage. Had this advice been heeded and the wealth of grass created by nature conserved, the Great Plains country would be as populous as its capacity warranted today. The fallacious theory that the semi-arid region could support a family on every 160 acres, as I heard a dry farming enthusiast assert at Miles City in 1903, has been exploded. The damage has been done. From a vegetation standpoint it may not be irreparable, but title has passed to a multitude of owners. Fifty years ago an intelligent Congress might have surveyed the entire area on a stock-farm or balanced ranch basis, according to contour and productivity. Long term leases to responsible livestock men would have assured permanency. Balanced ranches, with summer and winter pasture, hay meadows, and wells were the simple conservation policy possible to them.

Instead, free grass as long as it lasted, initiated an era of depletion. What was everybody's property actually belonged to no one, consequently few were concerned. Dry farming came along to complete the vicious circle.

TIME CAN HEAL

Time, reputed to possess capacity to remedy all errors, may be operative in this case, but rehabilitation of the livestock industry must be worked out slowly. Sand Hill cattlemen acted promptly, homesteaded grass acreage by making entries for their employees, acquiring title from them, thus defeating political ignorance. Possibly as the depleted range so-called reverts to the states for tax non-payment, acquisition will be possible on a reasonable valuation basis and an enormous acreage of grass land reclaimed. The logical place for agriculture is under the high-line ditch. Down in Texas, where the state controls grass land, a similar disaster was prevented by the exercise of intelligence.

How promptly these northwestern pastures stage a comeback had been demonstrated in Montana recently. Give the natural grasses an opportunity to reseed by avoiding excessive grazing and nature will do the rest. John J. Ingalls' "Apostrophe to Grass" is axiomatic.

SET-BACK

This drought has seriously set back recuperation of the western cattle industry at a moment when substantial progress toward rehabilitation was under way. Favoured sections have avoided ruinous liquidation; elsewhere cattle have gone aboard the cars to beat a possible hard winter on short rations, but characteristically the cattleman is not discouraged. Had his psychology been different, the industry would have disappeared long ago.

The same identical thing took place in Western Canada, and the remedies are the same, including use of our crested wheat grass, which has aided them there.

It would appear, therefore, that we have lacked a policy, for a great many years, for Captain Palliser, Hinds, and others found drought conditions back in the sixties. A well known and successful rancher of the short grass area, who has spent a lifetime at the occupation, both in this province and in Saskatchewan, has this to say on the subject:—*

Grass can be converted into useful products such as beef, mutton, milk, butter, cheese, leather and cloth as well as innumerable by-products, with very little outlay. It would seem that a resource of this nature should receive more attention than we in Western Canada have been giving it.

I do not want to leave the impression that we should have all Western Canada in grass. I would say, however, that we should be careful as to where we draw the line between the parts of the country that will produce the most revenue from grain in a given period of years, and parts that would be of more use left to grass, if administered under a set of regulations that allowed proper and efficient use of the land at a rate which could be earned.

*"Nature Helps Feeder but Hits at Grower"—By James E. Poole. American Cattle Producer, November, 1939.

If we look around a bit I think we will come to the conclusion that Nature, in her scheme of things, has definitely drawn these lines. For a long time Canada has been wheat minded and refused to believe that the West was not all wheat country. Palliser pointed out in 1857-1860, from a botanist's point of view, the variation in land and climatic conditions as well as what might be expected in an agricultural way from certain sections of the West. Time and effort have proven that Palliser was right in his findings.

The first demonstration to cultivate the grazing area was made when the Lester-Kaye Colonization Company brought people from the Old Country and tried to farm it. They met with little success and eventually gathered up the livestock from the different farms and made a grazing outfit. From then on they held together very well by harvesting the grass through livestock.

We have made attempts since to grow grain in this area from time to time at about ten to fifteen year periods. The outcome has always been the same; that is an immense outlay of capital and energy with small returns and much distress for many people. This area has at times grown exceptionally good crops, but these seasons have been too far apart. I don't believe it is a question of the quality of the land, but more one of climatic conditions. It is necessary to have moisture to grow anything, and from the Rio Grande to the North Saskatchewan moisture is the problem and the ruling factor.

*As Mr. Gilchrist has stated in his article, "from the Rio Grande to the North Saskatchewan, moisture is the problem and the ruling factor." This section of the Report has endeavoured, as it pertained to the short grass area of Alberta, to point out with as many salient facts as possible and with the presentation of opinions from as wide a number of authorities as time permitted in such a research.

In concluding Part One of this Report, it must be pointed out that many a present day stock grower in the short grass area of Alberta today came to this part of the West, with the intention of farming, and became a rancher of necessity, due largely to climatic conditions; and by long and bitter experience has learned to live in order to survive, and at the same time has contributed to the national economy from this section of the country, which nature has endowed as a great stock growing area, through the medium of the natural grass cover.

This Report is now brought to the study of methods and conditions in other pastoral areas of the world, including the adjacent portion of the Western States embraced in the short grass prairie area of America, which also includes south-western Saskatchewan. Some of the conditions and regulations also in British Columbia, the stock from which comes into competition in the Coast markets with Alberta livestock, are considered in Part Two of this Report, which deals with the short grass stock growers' proposals, costs of production and rehabilitation of grazing lands of the short grass area, together with recommendations offered from the facts gathered in this investigation.

*R. P. Gilchrist, Wild Horse, Alta., "Grass as a Resource," Canadian Cattleman, Calgary, March, 1940.

PART II

Section I

LAND POLICIES—OTHER PASTORAL COUNTRIES

In order to give the stockman of the short grass area some idea of the regulations and methods under which stockmen in other pastoral countries in the world operate, the following summary of the main features and conditions of Australia, New Zealand, South Africa and the U.S.A. are submitted for his study. The general conditions pertaining to the livestock industry in the Republic of Argentina are also submitted as their livestock come into world competition with the short grass stockmen's cattle.

The following material is reproduced from the files of the Dominion Range Experiment Station:—

AUSTRALIA—QUEENSLAND

GENERAL

Unlike the Union of South Africa, Australia has a wide variety of Land Policies. Each State in the Commonwealth administers its own laws, and very little uniformity of policy is evident.

The chief cattle-raising state is Queensland, followed by New South Wales, South Australia and Western Australia.

QUEENSLAND

Carrying Capacity: 10 to 60 or more acres per head of cattle.

Cattle Population: 5½ million.

Sheep Population: 2 million.

Human Population: 1 million.

Size of Ranches: 100 to 1,000 square miles.

Pastoral Leases: For term of 30 years. Rent is determined by the Land Court. No residential requirements, or improvements necessary, unless specified in beginning of term. However, fencing, developing water and destroying noxious weeds may be required of the lessee.

Grazing Selection (for sheep): About 20,000 acres with rental of 2c to 6c per acre per annum.

Grazing Selection (for cattle): About 60,000 acres with rentals from ½c to 2c per acre.

Grazing Homestead: Up to 60,000 acres. The lessee must reside on it for the first seven years.

Grazing Farms: Up to 60,000 acres, continuous residence is required of the owner. The term of lease for a grazing farm or homestead may be any number of years up to 28. Annual rent is as declared in the opening notification for the first seven years, after which time the Land Court decides what it will be.

These grazing selections must be fenced within the first three years of time.

Development Grazing Areas are lands that will cost a large amount to develop before they can be utilized for grazing—up to 60,000 acres. Tenure of 40 years. No rent is charged for the first few years, after which the rent is $1\frac{1}{2}\%$ of the improved value of the land. The lessee must undertake specified improvements.

Perpetual Leases: Up to 2,500 acres. This land can not be converted to freehold. It is infested with prickly-pear which the lessee must eradicate. Rental is similar to that of Development grazing areas.

Apparently all the grazing areas are divided into fairly large units sufficient to establish a self-contained stock growing centre. As the leases on these units expire, they are publicly advertised, with all particulars about type of land, area, rentals, etc., being given. Applications are received and judged by the Land Courts on their merits.

Land Tax: All lands alienated from the Crown are subject to a land tax. The rate of this tax operates as a sliding scale which increases as the value of the land increases i.e. if the taxable value:—

is less than \$2,500—tax is 4 mills on the dollar;

is over \$2,500 but less than \$5,000—tax is 6 mills on the dollar;

is over \$5,000 but less than \$10,000—tax is 7 mills on the dollar;

is over \$10,000 but less than \$15,000—tax is 8 mills on the dollar;

All over \$375,000—tax is 24 mills on the dollar.

The tax is assessed on the unimproved value of the land. When the land is used for grazing purposes, tax-redemptions are provided, e.g. all holdings valued below \$7,500 are exempt. The exemptions decrease as the value increases to \$15,000; for all lands valued above \$15,000 the exemption is set at \$1,500.

AUSTRALIA—SOUTH AUSTRALIA

ADMINISTRATION

A Pastoral Board and a Commissioner of Crown Lands govern all land laws.

Size of Leases

No limit is placed on the size or number of holdings that can be held by one individual, provided the commissioner is satisfied that he can handle it properly.

Lease Types

A 42 year lease can be obtained on land that has been leased for some time past. Before this lease is granted the Crown may resume one-third of the better type land, and one-eighth of the poorer land. The rent conforms to accessibility to market, railway communications and carrying capacity. It is fixed for 21 years and may be increased or decreased, not more than 50%.

On areas that have never been leased a 21 years lease at a peppercorn rental can be obtained. This carries the right to obtain a further 42 years lease at the end of the first period. Rent to be 9c per acre for the first 21 years, and not more than 14c per acre for the second 21 years. Area to be at least 250 sections.

Development Leases

The Crown offers a bonus of \$1,000 for a well producing 4,000 gallons of good stock water per day. In addition the Crown grants a special lease of 100 square miles surrounding the well without rent for 10 years, then 12c per section for one year, after which an ordinary lease is obtainable.

In other words the lessee pays \$168.00 to rent 64,000 acres for 21 years, and is donated \$1,000.00 cash, if he can produce a well of 4,000 gallons per day on the waterless area.

Carrying Capacity

Areas that receive $7\frac{1}{2}$ to 10 inches of rainfall per year carry 25 to 30 sheep per section—(12 to 6 acres per sheep).

Country with less than $7\frac{1}{2}$ inches carries less sheep.

Cattle country is extremely poor, and is a long distance from market. It receives 4 to 5 inches of rainfall and can carry 2 animals per square mile (320 acres per cow).

Stocking and Pastoral Leases

5 sheep or 1 head of cattle per square mile for first seven years.

20 sheep or 4 head of cattle per section for the rest of the term. These requirements may be reduced on inferior land.

Sub-Letting

Leases may be sub-let after the first five years.

Classification of Lands

The State Land Board has all Crown lands classified under three headings:—

Class A: All lands convenient to rail and market which can carry at least 30 sheep per section.

Class B: All lands with the above carrying power, but which are not near rail communication or markets.

Class C: Include all lands not in the above classes.

Apparently the State of South Australia produces very few cattle. In fact it has to import cattle for its own consumption. Sheep raising appears to be more suitable to most of the State.

AUSTRALIA—NEW SOUTH WALES

Cattle population—3,350,000.

Sheep population—52,000,000.

ADMINISTRATION

The state is divided into 15 smaller land districts. Each district has a local Land Board which administers all land laws. There is one large division in the western part of the state which is administered by a Commissioner of Lands.

Crown lands available for lease are set out in blocks varying from a few acres to several thousand acres. As leases expire, the land is reserved from further lease or sale until otherwise notified in the Gazette.

Many leases are disposed of by auction, the lease going usually to the highest bidder. In some cases tenders are called for. The applicants state the rental they are willing to pay and other necessary particulars.

Types of Lease

There are several types of lease available in the State, depending upon the type of land and the use made of it. These include: Conditional leases, Crown leases, inferior land leases, scrub leases, improvement leases and annual leases.

Rental

Is set by the Local Land Board or Land Commissioner and varies from 1c per acre to 25c per acre, depending upon the carrying capacity, nearness to shipping facilities, improvements and value for agricultural purposes.

Tenure

Varies from one to forty years on the different types of lease. Occasionally a lease in perpetuity is given to a lessee.

The majority of the grazing areas have been surveyed and information on soil type, vegetation, topography, etc., of any particular parcel of land is readily available.

No mention is made of taxation.

Size of Leases

As a rule the size of the lease that can be obtained by an individual is limited, depending upon the type of the lease.

Commonwealth of Australia

Serious periodic drought in Australia affects industry. 1940, 7 million dollar relief programme.

AUSTRALIA—WESTERN AUSTRALIA

No information is available concerning lands system in this state.

This is also the case with the Northern Territory which is administered by the Commonwealth Government.

LAND SETTLEMENT ACT SOUTH AFRICA

Organization

All Crown Lands in the Union of South Africa are administered by a Central Land Board. There are five local Land Boards which are under the jurisdiction of the Central Board.

These Land Boards allot Crown Lands under lease agreements or sale agreements. They also buy up privately owned lands for subdivision into suitable holdings for agricultural land and grazing purposes.

Land Tenure

Lease tenure is for five years carrying an option of purchase at a price fixed by the Land Board when its lease is entered into. Under special circumstances an additional five years lease is granted at the expiration of the first term.

Rental

No rent is payable for the first two years; 2% of the purchase price is payable for 3rd year; 3½% of the purchase price is payable for the 4th and 5th years.

When the lease is extended for another 5 years 4% of the purchase price is payable throughout the term.

In certain semi-arid regions there are reduced rates. No rent for first two years and rental at 1% purchase price for the remainder of the period.

Purchase Options

If the purchase option is taken up during the 5 year lease period, the lessee must pay in advance interest at 4% on the purchase price. The lessee is allowed 40 years to pay up the principal or purchase price. This is to be paid in 40 equal instalments.

In semi-arid districts interest is 1% and 40 years are allowed to pay up the principal.

Land Values

All lands are valued by a government valuator, working in conjunction with the land boards. The cost of all improvements is added to the value of the land. The lessee must improve the land to the extent of 20% of the value of the raw land during the first 10 years. Residence of 4 months per year is required of the lessee.

Assistance to Lessees

Advances up to \$2,500.00 are made to lessees to stock and equip their leases. These loans are made on the recommendation of the Land Board.

Ranching Condition

Year around grazing. No supplemental winter feeding necessary. Lack of calcium or phosphorus is a serious problem. Cattle are not of exceptionally high class. Cross between bulls of standard breeds and the native indigenous cows. Afrikaner bulls are also used.

Total cattle population is approximately 11,000,000.

Taxation

No mention of taxation is made on lands leased from the Crown.

Land values are based on carrying capacity, distance from railroads, and any improvements that have been made.

THE ARGENTINE LIVESTOCK INDUSTRY

Land Administration

Argentina is divided into 14 provinces and 10 Federal Territories. The provinces administer their own lands, while the Federal Government administers the privately owned. The Federal Government leases land for three periods of 20, 10 and 5 years.

Homestead Law

Up to 25,000 acres are granted to families. Price paid is arrived at by the capital of the settler, the distance from a shipping point, the price of wool, meat, etc. It is paid by yearly instalments.

Carrying Capacity

Approximately 9 acres are required for 1 sheep in the Federal Territories, which are the poorer lands.

The total average carrying capacity through the whole of the Argentine would be approximately 2¼ acres per head of cattle. This figure includes much land that does not raise cattle, so the actual carrying capacity would be higher than this figure.

A yearly tax is levied on alienated lands. There is no direct tax per head on cattle and sheep, but a tax is levied when they are moved from one district to another.

ARGENTINE LIVESTOCK INDUSTRY

Land Areas and Policies

384,000,000 acres available for livestock breeding.

59,000,000 acres of this area are cultivated, 193,000,000 acres of State Lands still available. Land values vary as distance from ports e.g. \$80.00 per acre near Buenos Aires to \$6.00 per acre 400 miles inland. Land prices are one-third to one-half those in United States. Land is sold by annual instalments over a term of 4 to 5 years. State lands are sold or rented at very low prices.

Pampa

Is the main stock growing area in the centre of the country. It includes all of the province of Buenos Aires. The western half is semi-arid, but the eastern half has ample rainfall and produces 80% of all agricultural products of the Republic.

About 1,800 grants of large tracts of land were obtained without price. These have been inherited from one generation to the next. There is still free land obtainable in the submarginal districts.

Land Law

Public lands can be leased in limited areas by individuals for agricultural purposes or livestock. Procured at annual rental fixed by the Department of Agriculture.

Movement to break up large estates or "estancias" now used for grazing and open them to immigrants and small farmers.

Taxes

National and Provincial Legislatures have been composed mainly of land owners and livestock producers. They have seen to it that revenues are raised by tariffs on imports and exports and licences to buy, sell and transport commodities leaving land and livestock practically exempt from taxation.

Livestock owner pays no taxes until he attempts to move stock out of the local jurisdiction. Then he pays a head tax.

Grazing

Natural grasses of Pampa are not nutritious and alfalfa is sown for grazing; fully one-half the grain exported from Argentina is an incident to cattle raising, being grown on grazing lands that are being prepared for seeding or reseeded with alfalfa for stock grazing. Average yield is 2 tons of hay, but it is grazed off. Rancher makes a contract with wheat grower to raise wheat four or five years and then sow the land down to alfalfa. All cattle are fattened on alfalfa.

Much corn is grown but it is exported to Europe, not fed to cattle.

Livestock

Argentine Rural Society has done much to raise livestock standards. Each year it stages the Palermo Exposition and Sale — largest and most extensive in the world. Shorthorns (50%) are the predominating breed with Herefords next. Very high qualities are found here.

Cattle population—approximately 33,000,000 head. Climate is ideal for livestock and grazing is carried on all year around. Hay production is not necessary.

Average size of ranches, 5,000 to 10,000 head.

It can be readily seen from the foregoing that many means of encouragement are given to the stockman with a view to establishing permanency in his business.

In Australia, although methods differ in the separate States, the general policy may be stated to offer every encouragement to the stockmen to develop the States' grazing resources. Permanency of tenure up to 42 years, and even perpetuity in isolated cases, is given.

To develop water in the desert regions of South Australia the Crown offers a bonus of \$1,000 for a well producing 4,000 gallons of stock water, a rent free area for ten years and small increasing rental to the end of twenty-one years.

With all the land surveyed, Government authorities have detailed information covering the entire area, soil, vegetation, improvements, topography, with the size of lease varying according to carrying capacity; and the stockman is assured of a lease which will make an economic unit, while the regulations provide a limit to the number of stock which may be grazed upon the land.

In South Africa the stockman can secure a lease for 5-10 years with the option to purchase, from the Land Board, which has administration of all these lands, with 40 years to pay at 1% interest in semi-arid regions. The Board can recommend loans up to \$2,500.00 to help stock the leases.

It must also be pointed out that the South African stockman enjoys year long grazing with no winter feeding; land values are based upon the carrying capacity, distance from railroads, etc., which gives him a policy tending to permanency, commensurate with the long term trend of the business. One big obstacle has to be contended with, however, and that is the natural lack of calcium and phosphorus in the soil and forage, which must be supplied by the addition of large quantities of mineral supplements.

Predatory animals, also, and parasitic pests, including locusts are additional hazards which must be considered.

In the Argentine, the different States administer their own lands, with varying policies, the Federal Government administering the policies in federal territories. Lands in the Argentine for the most part are privately owned, containing large ranches running up to 10,000 head, and originating from the old land grants to Spanish settlers.

The raising of the great wheat crops of the Argentine are an adjunct of the livestock business and incidental to it.

Land and livestock are practically exempt from taxation, livestock paying a head tax when moved out of the local districts,

when collections are made. The general revenues are raised by tariffs on exports, and by licences to buy, sell or transport commodities.

It may be said, therefore, that in so far as livestock are concerned the Argentine cattle producer pays his taxes based upon the value of his product, or in other words based upon his production.

The co-operative purchase of outstanding sires by the Stockmen's Association there has made standardization possible, which is a feature of Argentine beef. The advantage of natural feeding, such as fattening upon alfalfa, make grazing in the Pampa another feature of real value.

A still further advantage is that the producer is never more than five hundred miles from tidewater in practically every section of the Argentine.

It is suggested that the address of Mr. Arkel, Dominion Department of Agriculture, dealing with his visit to the Argentine, be read.

OTHER PASTORAL COUNTRIES—GRAZING REGULATIONS—NEW ZEALAND

In New Zealand the State controls the leasing of grazing lands, which are issued for a period of 21 years.

The size of a unit varies, consisting of small grazing "runs" of from 5,000 to 20,000 acres. The maximum size of pastoral runs is not greater in extent than will carry 20,000 sheep or 4,000 head of cattle.

The large private holdings were purchased by the State and leased to settlers. The revenues from such are loaned to settlers and stockmen.

All lands are classified; those suitable exclusively for pasturage are leased; those suitable for agricultural purposes may be acquired either by purchase or leased in perpetuity.

Improvements on leased lands are considered the property of the lessee.*

New Zealand grazing leases regard the 21 year lease as a feature of stability for the grazing business; also, with all land classified, the pastoral runs are limited to the carrying capacity limits of the acreage which are capable of supporting a stated number of sheep or cattle.

Loans to settlers and stockmen of the revenues accruing from the grazing leases is a feature not found elsewhere, except in the case of the Land Board of the Union of South Africa, which makes loans to settlers and graziers on their purchased or leased lands.

It is also to be noted that large private holdings of land were purchased by the State and released to settlers and

*Bulletin, No. 1001, U.S.D.A., See Land Laws of New Zealand.

incoming stockmen, which the United States has done recently in some cases of late, in order to consolidate lands under their control and eliminate the "checker board" pattern of some localities in the Western States.

No mention is made of rates, but it is presumed, as the lands are all classified, that such rates are based upon the carrying capacity.

OTHER PASTORAL COUNTRIES—GRAZING REGULATIONS—UNITED STATES

The Appraiser found in his investigations in the States of Montana, Wyoming and Colorado, that they had embarked fully upon the third stage advocated by Mr. Wooton in his Bulletin in 1922, with conservation as the keynote.

*In the 11 Western States there are approximately 260,000,000 acres of arid grazing lands, 260,000,000 acres of semi-arid crop land, 128,000,000 acres of forest and woodland and 40,000,000 acres of desert lands.

Since nearly all the forest and woodland is operated as arid grazing lands, it follows that over half the area of the 11 western States is used as arid grazing land and must continue to be so used. Practically all the Government land remaining unreserved is arid grazing land and lies scattered in smaller and larger parcels among lands of other tenure in all these States. Hence the conclusion is reached that the land policy under which the disposal of these lands is made is of great importance to one of the principal industries, occupying about half of the area in the western half of the country, and employing many people.

It is believed that much of the great plains region in eastern Montana and Wyoming, shown here as dominantly dry-farming land, will ultimately prove to be semi-arid grazing land.

In the administration of grazing lands in these States, there have been two agencies operating, the United States National Forest Service, as a branch of the United States Department of Agriculture, handling grazing on the national forests, whilst the States administer their own state grazing lands.†

The State grazing lands comprise largely the school lands received under educational endowments from the Federal Government, usually comprising sections 16 and 36 (except New Mexico which has sections 2 and 32 in addition), in place of 11 and 29 in our township surveys.

Their land structure is further complicated by railway grants, Indian reservations and various other grants to the States for assistance in construction of State Capitols, etc.

The remaining unpatented lands in the hands of the Federal Government have now come under a third agency in these States, the Grazing Administration of the United States Depart-

*Tenure and Use of Arid Grazing Lands, Bulletin, 1001, U.S.D.A., E. O. Wooton, Assistant Agricultural Economist.

†The general administration of federal lands, homesteads, etc., and public domain came under the Land Office, United States Department of the Interior.

ment of the Interior, by virtue of the Taylor Grazing Act, which is a very forward step in their conservation problem and the handling of the former public domain.

Therefore, as each has a bearing upon our problems here, the Appraiser proposes to deal with these agencies in a brief outline of some of their operations in the States of Montana and Wyoming and some of the land policies of other Western States, which present some advantages to our policies and recommendations of this Report.

It must be pointed out with regard to many of the State lands, that if some of these were in inaccessible places, such as on mountain tops, etc., the States were given the privilege of "selection" in place of sections 16 and 36 for other unalienated lands of Federal Title. In such selection, many of these were blocked in the more favourably situated counties of these States, and has a bearing in their rental rates. Many are isolated sections controlling water, etc., or completing the stockman's unit, as do many of our school sections with higher rates than the land is actually worth as grazing land.

In the Western States, as a result of some of their past mistakes similar to ours, plus the presence of the public domain as shown elsewhere in this Report, the following conclusions were reached by their investigators:—

(1) That the arid grazing lands are today mostly overstocked and deteriorating under the present form of use.

(2) That they are being operated at a low standard of productivity because of poor organization.

(3) That this form of use is brought about by our land laws.

It hardly need be stated that this sort of use ought to be stopped and that it is high time that we changed these land laws. Though improvement in organization of the range stock business does not necessarily follow a change of methods of tenure, improvement is absolutely impossible under existing laws.

Students of our national development have pointed out that in the occupation and conquest of our country we have passed through two stages of development and are now just becoming aware as a nation that we have reached a third stage. During the first stage individual enterprise for personal and family benefit was dominant and conquered the wilderness. The idea of husbanding natural resources received practically no thought. The next stage was one of collective enterprise, for the benefit of communities or of individuals forming them. During this stage great internal developments took place and new cities and states were erected. This was also the stage during which great monopolies, largely based upon control of natural resources, etc., began to develop, with the characteristics of the first stage more or less dominant. The third stage upon which we have now entered is one in which enterprise is largely collective and co-operative and should be directed toward the larger benefit of communities and the people generally, however difficult it is to realize this fully with our past inheritance. Larger social interests, however, are gradually being realized. Conservation is the resounding note. A difficulty is that under this new ideal, which must be pronounced essen-

tially democratic in spirit, there are still persisting those old individualistic elements so strongly encouraged during past decades of national development.*

In no place has this conflict of individual with group interest been more strongly shown than in the national forests and on the open ranges of the West, where pioneer conditions have obtained and the weight of the struggle to utilize natural resources and organize a productive business has fallen upon the individual. At the same time the general Government, with the sanction of the great majority of the people, has insisted that this development be of such a character as to protect the interests of society instead of that kind of development which will bring the greatest financial benefit to the individual.

In the national forests, development has now progressed to a stage where even the most rugged individualists are beginning to recognize that the present form of management is in many ways superior to that which they wished to perpetuate. The extension of the national forest plan is here proposed for the grazing ranges, and public opinion, so far as it is definitely formed, is in favour of this plan. The two outstanding results of the application of this system of control are that, while production is in no way reduced the benefits to be gained are more equable and most of the waste avoided.†

State of Texas

The State of Texas, when admitted to the Federal Union as the Commonwealth of Texas, owned all of its natural resources including lands. The administrators were far sighted and acquainted with the country and its climatic conditions; they enacted laws in the administration of their land policy which has lent stability to the livestock business and which has made Texas the great livestock state that it is.

The period of lease was for a period of either 5 or 10 years, with a protective limit of leasehold of 10 sections of land, or 6,400 acres of land, with no maximum limit.

Lands leased were, and are, subject to sale of the agricultural land contained during the term of lease in units not to exceed four sections. Grazing lands are not subject to sale during the term of lease. New settlers may lease a portion of large leasehold, provided such leases will not reduce the size of the leasehold to less than 10 sections.‡

The outstanding feature of their lease laws was the protective limit of 10 sections of land, which they deemed to be the minimum ranch unit.

The present term of lease for State lands in Texas is for a term of five years with a minimum rental of five cents per acre. These leases are not subject to renewal, and are subject to sale or lease for minerals. Rentals must be made annually and the lessee is given 60 days to make payment from due date.

Sales of school lands are infrequent, the one on January 2nd, 1940 being the first in 10 years. There remain 640,000

*Robert Tudor, "The Public Domain and Democracy," p. 217.

†Tenure and Use of Arid Grazing Lands, Bulletin, No. 1001, U.S.D.A., E. O. Wooton, Assistant Agricultural Economist.

‡Bulletin, U.S.D.A., No. 1001.

acres of unsold school land; with 100,000 acres under grazing lease, at an annual rental of from 5 to 25 cents per acre with an average of about 13 cents.*

NATIONAL FOREST SERVICE

It is not within the scope of this Report to go into all the features of operations of the grazing service of the United States Forest Service, though several of these have been dealt with in the course of this Report.

It is proposed, however, to deal here with the method of their grazing rate structure, in which the price factor is taken into consideration, and some other features having a bearing on cost of production.

Through the courtesy of the Chief Forester of the United States Forest Service, and his Chief of Grazing, will be found in the Appendix the copy of memorandum forwarded to the Secretary of Agriculture, when this method was first proposed and set up.

The Appraiser was given, in Montana and Wyoming as well as at Denver, as a result of the courtesy of the local foresters and the men of the Grazing Division, assistance in ascertaining their methods and the working of the scheme.

Some examples of operations and administrative costs of some of the forests, which may be of interest, are also quoted.

Originally the grazing fees in the forests were on a per head basis, largely based upon the carrying capacity of each respective range; then followed a complete appraisal of the forage resources of the national forests, after which it was proposed to place the rates, as a result, upon a "commercial basis." The "commercial basis" was arrived at by values established through comparisons made with other private range grazing rates, taking the carrying capacity, distance from market, etc. into consideration.

The stockmen, however, grazing the national forests, objected to these rates, pointing out that the most important factor, the price, which they received for their products, animals grazed on the national forests, had not been taken into consideration in the setting of such commercial rates. The present method is the outcome of this objection.

GRAZING REGULATIONS—UNITED STATES FOREST SERVICE—GRAZING FEES—BASIS MARKET VALUES

The Chief Forester, United States Forest Service, in his Memorandum to the Secretary of Agriculture, outlined, date of report, May 18th, 1933, the following as a result of their investigations:

Various means of relating grazing fees to the market of livestock have been investigated and the following conclusions reached:

*Letter to F. E. Mollin, ex-Commissioner, General Land Office, State of Texas.

1. No usable means of determining directly the value of forage in terms of livestock market prices have been devised.

2. The best and most direct index of the value of forage on National Forests is the price which stockmen pay for forage on comparable privately-owned lands.

3. Forage values as thus indicated are adequately expressed in range appraisal data as the basis of grazing fees now in effect.

4. Rental values of private land tend to reflect price levels received for the commodities produced on the lands, but a less marked extent and with a tendency to lag behind the changes in livestock prices.

5. By correlating the grazing fees as determined from the forage values on leased private lands with the average prices received for livestock over a representative period of years, a basis is provided for determining a working relationship between current grazing fees and current livestock prices.

The most direct and representative market prices for use for this purpose are the prices received by the producers for the principal classes and grades of animals sold from the National Forests. Weighted averages of prices received each month by producers for beef cattle and lambs in the eleven far-western States where the principal National Forests are located are compiled by the Bureau of Agricultural Economics to show yearly averages.

After making various adjustments the average fees on the National Forests, which became effective in 1931 were 14.5 cents per month for cattle and 4.5 cents per month for sheep.

The prolonged depression of livestock prices now existing makes it desirable to adjust the current grazing fees so as to lighten the financial burden upon the stockmen without destroying the basic relationship between grazing fees and a conservative forage value considered over a period of years. In order to accomplish this purpose it is proposed to adjust the grazing fees each year to the current value of livestock by the use of the ratio existing between the average grazing fees above stated and the average price received for livestock by producers of the eleven western States during all or a representative part of the period 1920 to 1932.

The average prices received during this period by these western producers were 6.23 cents per pound for beef cattle and 9.15 cents per pound for lambs.

On the representations, however, of the American National Livestock Association, through Mr. F. E. Mollin, the Secretary for the Association, that the 1932 prices were too abnormally low, a more common ten year period was suggested for the calculation of cattle prices; and the Forest Service suggested the period of 1921-1930 as possibly the fairest for cattle, being a fairly complete cycle, without taking the abnormal lows of the depression about 1932, when the average price for beef cattle was 6.62 cents per lb.

The National Wool Growers' Association, through their Secretary, Mr. F. R. Marshall, was satisfied with all phases of the sheep proposals so that the period 1920-1932 was taken for sheep, price of 9.15 cents.

It would have been more desirable, could such have been possible, to take the same periods for both, but due to variation

in length of price cycles of the two industries, the two different periods were deemed to be fairer to all concerned.

The rates, therefore, for 1933 were determined as follows: The Bureau of Agricultural Economics determined the average price for the 11 far-western States, for cattle to be 4.13 cents per pound, 1932, while that for lambs for the same year was 4.18 cents per pound.

The cattle rate came into the equation, therefore, as the 1921-1930 average price of 6.62 cents is to the 1931 forage appraisal value of 14.5 cents per head per month and the 1932 price of 4.13 cents per pound is to the 1933 fee. In formula this becomes:

1933 Cattle Rate	Formula
$6.62 : 14.5 :: 4.13 : x$	$= 9.05 \text{ cents per head per month}$

The 1933 rate for sheep became in the same manner, only taking the average price for 1920-1932 period, under the formula:

* 1933 Sheep Rate	Formula
$9.15 : 4.5 :: 4.18 : x$	$= 2.05 \text{ cents per month per head}$

This gave a reduction of 54% in the case of sheep from the average appraisal fee, or the base rate of 1931, while giving the cattle a 37.6% reduction from the base rate, thus making a very substantial reduction in the rates on the Forests of the West in the year 1933.

The Acting Chief, Division of Range Management, United States Forest Service, stated in his letter to the Appraiser, as follows:

The above method of determining the grazing fees is uniform for all the national forests. However the base rate differs for different forests and parts of forests, depending upon the topography, accessibility to markets, rentals for similar private ranges in the locality, and other factors.

For example, the Custer National Forest is situated in the short grass range country, comprising some 490,000 acres of good range, and the basic rate is 16 cents per head per month for cattle.

The period of use on this forest is from May 1st to November 30th; the Forest Service furnishes all the water and does the fencing. However, if the stockmen do any fencing the Forest Service pays them the grazing fees at the valuation by the Forest Service.

The grazing rate on the Custer National Forest in 1934 was 52% of the basic rate of 16 cents, or 8.32 cents, while in 1935 it was 60% of 16 cents per head per month, or 9.6 cents.

The Madison National Forest is situated in the foothills of Montana, comprising some one million and a half acres. In 1935 the grazing rates were 21 cents per head per month for cattle, and 5¼ cents per head per month for sheep for a period from June 1st to October 1st.

Fees vary according to range—rough range is lower—with the finest range at higher rates. With some 6,617,000 acres

*Fee for 1933.

in Montana and Idaho, the actual receipts on a per acre basis were .0301 cents per acre or a little over three cents per acre, while the administrative cost worked out at .0055 cents per acre or about five mills per acre.

There are actually about five million acres of forest range used in Montana for the grazing of livestock.

The same rates as on the Custer National Forest in Montana apply in South Dakota on some 300,000 acres.

The Madison National Forest receipts were stated in 1935, on a per acre basis, to be, sheep .044 cents per acre and cattle, .029 cents.

The value of privately owned range in Montana in 1935 worked out at about 27 cents per head per month average; annual tax five cents per acre.

At that time there were about 2,000 different outfits putting stock on the National Forest Ranges in the Montana region, with an average investment of \$86.00 per head for cattle and \$16.00 for sheep—that is, investment in owned land, equipment, etc., not including the cattle.

Ten year permits were the rule with some outfits having had permits for 25 years.*

On the Lewis and Clarke National Forest in Montana, situated near Great Falls, the following gives some idea of the percentage of the 1931 base rates of 14.5 cents for cattle and the 4.5 cents for sheep:

1933	Cattle, Horses	62.4%	1937	Cattle	87%
	Sheep	46%		Sheep	81%
1934	Cattle	52%	1938	Cattle	103%
	Sheep	53%		Sheep	94%
1935	Cattle	55%	1939	Cattle	92%
	Sheep	60%		Sheep	73%
1936	Cattle	90%			
	Sheep	75%			

On the basis of acres the 1938 income—Lewis & Clarke Forest—was .0257 cents per acre—70.4 cents per head per year.

It can be seen how the fees charged under this system, with the price taken into consideration, have varied from year to year according to the price received by the stockman for his products the preceding year. It is admitted that there is a lag of one year in this method, but after all it is on the basis of the previous year's operation that the stockman everywhere pays his grazing charges for the following year, and it equalizes fairly well over a period of time.

What is the stockman's re-action to the fees being based upon the market factor?

Mr. F. E. Mollin, Secretary of the American National Livestock Association, with its affiliations in the 11 far-western States in connection with grazing upon the National Forests in those States, was interviewed by the Appraiser at his office in Denver, Colorado.

He stated that the great majority of stockmen using the National Forests in these States were more than satisfied with the rates, taking the price factor into consideration and that

*Files, Dominion Range Exper. Station, Manyberries, Alberta.

it was very seldom now that he received any complaints from members with regard to the present fee set-up upon the National Forests.

The Forest Service is endeavoring to use the best methods in handling the ranges; that is, to have the proper number and class of livestock on a given range in the proper season and handled according to approved practices. This has been done by the establishment of the 10 year permit, so that the ranchman could plan his operations, instead of the annual permit, fenced allotments and the segregation of cattle and sheep. It has encouraged the building of fences by the stockmen, by returning this investment to the stockmen in the form of reduction in grazing fees.

Some Forest ranges have been overstocked during the dry years, but such "sore spots", after consultation with the Advisory Stockmen's Committees, have been refused permits on over-grazed areas of this nature. The fuller use of these Committees by the Forest Service in the last few years, as well as use of the 10 year permit and the rates based on the market factor, have led to a better understanding between stockmen and the administrative officials of the Forest Service.

The Forest Service, in cases of extreme drought in some forests when value received could not be given to ranchmen for the fees paid, has remitted such grazing fees.

The Bureau of Agricultural Economics' yearly averages of prices for livestock from the 11 far-western States are used in calculations for the basis of grazing fees each year in the formulae previously outlined. These yearly averages, for the preceding year, become available in February of the following year, in time for the rates to be set for the summer grazing season. That is, the 1939 average market prices became available in February of 1940, and upon those figures the adjustment of rates under the formulae were worked out, and the rates for 1940 grazing fees set.

GENERAL

The main objects of the United States Forest Service, in their administration of the grazing resources of the National Forests of the United States, in which they are concerned, are set forth in "The Use Book", Grazing Section, which is quoted as follows:

The leading object of the grazing regulations are—

1. The protection and conservative use of all national forest land adapted to grazing, under principles conforming to the natural conditions surrounding the forage resources.
2. The permanent good of the livestock industry through proper care and improvement of the grazing lands, under principles conforming to the requirements of practical operation.
3. The protection of the settler and established ranch owner against unfair competition in the use of the range.

It is expected that stock owners will earnestly co-operate in carrying out the regulations.

There is no law which gives an individual or corporation the right to graze stock upon the national forest lands. The establishment of private rights in the national forest lands would defeat the social purposes to which they have been dedicated. The grazing of such lands may be allowed by the Secretary of Agriculture only as a personal privilege. It is transferable only within the limits and restrictions set forth in these regulations. Grazing stock upon the forests, except in accordance with the regulations, is trespass against the United States.

A reduction will be made from the number of stock grazed during the previous season, if owing to the number grazed or the method of handling the stock, damage is being done to the forest, and in extreme cases all stock will be excluded.

Except as provided under the regulation, all grazing permits are issued upon a per capita basis.

The United States Forest Service bases their authorizations for each forest for the number of head of livestock permitted to be grazing thereon, upon the most reliable carrying capacity estimate available. This is set with an endeavour to always have a 25% carry-over from year to year of the most palatable species of the forage as a reserve of same.

The Service is assisted by local advisory boards of representatives of the local permittees' boards from the State and National Livestock Association, and provision is made for grazing boards to assist in the administration and arbitration of complaints. As mentioned previously, greater use of these boards by the Forest Service, and fuller understanding by the stockmen of the benefits from same, has led to a better understanding between the Service and the majority of the permittees in the last few years.

The Forest Service has a staff of highly trained men in their Division of Range Management to assist in the administration of the grazing resources of the national forests and the research pertaining thereto. The Service is fortunate in the calibre of the men chosen. The technical training and experience of these men are available to the industry and the Nation.

As the pioneers of scientific range management upon the American Continent, the United States National Forest Service can be looked upon as a reliable guide, resulting from its researches and administrative experience not only in America but throughout the world, and due to those efforts and experiences which have materialized as a consequence of becoming adaptable to local conditions.

In response to the Appraiser's question as to how cheat grass could be checked on the Alberta range, they stated their experience had been that a policy of moderate grazing would permit the native grasses to more than hold their own against it. The Bison range, under the supervision of Dr. Norton, was cited as an example, where moderate protection by proper grazing methods showed a fine stand of grass with cheat grass checked, while right across the fence, upon unprotected range, the cheat grass was rampant. Time did not permit the Appraiser to view these results when in Montana.

Experience in their sheep studies has shown them that operators with one and two bands of sheep, other things being equal, are the most successful. Beyond this number, it then devolves upon the managerial ability of the individual whether the larger outfit is a success. This bears out Mr. Kindt's Sheep Survey in the West here some years ago.

The Appraiser was informed in Denver by Mr. Schwan of the Forest Service of the growing use of the "Partificio System" amongst sheep operators of the south-west, in dealing with the labour problem of their Mexican herders. This system is simply a share of the increase of a portion of the flock, in addition to the herders' regular wage and subsistence, lending to stability in labour turnover, and greater care in management, which is an important factor.

Early sheepmen in Alberta practiced a similar system with their herders, and many a sheep man in Alberta today owes his start to that method, which in the Appraiser's opinion, is worthy of continuance both by the sheepman and cattleman here as well.

They have found that much over-grazing with sheep occurs from too close herding, or not moving bed grounds often enough; the latter not altogether the fault of the herder, but can be laid rather at the door of the owner or camp tender for not moving camp or for not seeing that it is done often enough. The same may be said with regard to many of our sheep ranges here.

Most forests have a check field grazed constantly, used as a "yardstick." For example, Custer National Forest has one of 2,000 acres which is closely watched, and the .8 forage acre unit per animal is raised or lowered to compensate when calculating the carrying capacities of the field.

The Service has a number of grazing experimental stations. The results of some of their experiments have been quoted in this Report, especially that of Dr. Hurtt, at the Miles City Experiment Station, on over-grazing costs with calves. This station is situated under similar conditions to that of the Dominion Experiment Station at Manyberries, Alberta, and the Appraiser suggests that the short grass stockmen take every opportunity to visit this station in Montana, as it will give them a better appreciation of the work of the Dominion Station. It is suggested, also, that greater opportunity be given for all officials of the Dominion Range Experiment Station to often visit this station and compare notes, methods and results, and vice versa, so that the courtesy of the American officials may be returned and many startling results may be obtained by such closer co-operation.

Unit

Their experience has shown that the economic cattle unit varies under local conditions from about 300 to 800 head.

Water

They have found that it costs the stockmen money if stock have to go over a mile to good water, which shows the returns on good water development schemes.

Ratio

Their experience has shown over a number of years that the ratio or conversion factor of cattle to sheep on mountain range is about 4 to 1. The 5 to 1 ratio for prairie conditions, however, was deemed by the officials to be fair.

Horses

Due to the amount of range which horses will cover and the amount of damage done to forage by trampling, etc., the Service charges horses a rate 25% higher than that charged per cattle unit.

Conservation of the grass resources of the National Forests by the proper grazing of livestock under scientific range management methods can be said to be the grazing policy of the United States Forest Service.

UNITED STATES—DEPARTMENT OF THE INTERIOR— TAYLOR GRAZING ACT

The Taylor Grazing Act, enacted and approved on the 28th day of June, 1934, is a Federal Statute, providing for the control and the administration of the former public domain, in co-operation with the States. The Act is administered by the Grazing Service of the United States Department of the Interior under the direction of the Secretary of the Interior.

The Statement by the President of the United States on Approval of the Taylor Grazing Act is as follows:

The passage of this Act marks the culmination of years of effort to obtain from Congress express authority for Federal Regulation of grazing on the public domain in the interests of national conservation and the livestock industry.

It authorizes the Secretary of the Interior to provide for the protection, orderly use, and regulation of the public ranges, and to create grazing districts with an aggregate area of not more than 80 million acres. It confers broad powers on the Secretary of the Interior to do all things necessary for the preservation of these ranges, including amongst other powers, the right to specify from time to time the numbers of livestock which may graze within such districts and the seasons when they shall be permitted to do so. The authority to exercise these powers is carefully safeguarded against impairment by State or local action. Creation of a grazing district by the Secretary of the Interior and the promulgation of rules and regulations respecting it will supersede State regulation of grazing on that part of the public domain included within such district.

Water development, soil-erosion work, and the general improvement of such lands are provided for in the Act.

Local residents, settlers and owners of land and water who have been using the public range in the past are given preference by the terms of the act to use of lands within such districts when placed under Federal regulation so long as they comply with the rules and regulations of the Secretary of the Interior. The act permits private persons owning lands within a district to make exchanges for federally owned land

outside a grazing district if and when the Secretary of the Interior finds it to be in the best public interests.

The Federal Government, by enacting this law, has taken a great forward step in the interests of conservation, which will prove of benefit not only to those engaged in the livestock industry but also to the Nation as a whole.

In addition to some of the benefits mentioned by the President, the Act also provides for the exchange of State owned lands by gift, within the bounds of a grazing district; exchange of Indian lands; co-operation with other Departments; transfer of forest lands to districts, or vice versa, where deemed necessary, and the leasing of small isolated parcels.

The Act also provides for the issuance of ten year permits, the same as the National Forest Service, lending stability to the lands, especially where only five year permits were issued by the State or leased for that period.

One fourth or 25% of all fees collected go towards range improvements, while 50% go to the State for the benefit of the county or counties in which these districts may be located.

A sample district in Montana is quoted below:

NEW GRAZING DISTRICTS

Montana Grazing District No. 6, an area used by approximately 160 stockmen, has been established by order of Secretary of the Interior Harold L. Ickes. The new district was carved out of Montana Grazing District No. 2 to permit consolidation of an area which is made up of 11 state grazing districts which are operated under co-operative agreements between the Secretary of the Interior and local associations of stockmen. The new district embraces 4,500,000 acres of private, state and federal land grazed by 6,500 cattle, 2,000 horses, and 43,500 sheep owned collectively by the associations of stockmen. The association plan has proved successful in Montana by promoting a co-ordinated use of land of varied ownership . . . An order of September 19 established Utah Grazing District No. 9 from District No. 6 'to permit consolidation of areas where uniform conditions serve to simplify problems of range conservation and management in that portion of the federal range territory'. The new district embraces approximately 2,200,000 acres. Establishment of this and the Montana district brings to 53 the number of general grazing districts created under the national conservation program.*

An idea may be gained by the reader from the above of the size of some of these districts and the magnitude of their problems, which are being worked out by co-operation between the Federal Government, States and Counties.

In Montana, the Montana State Grass Conservation Commission, which is mentioned elsewhere in this Report, is the outcome of such co-operation.

Quite a number of these Districts are being further consolidated, in Montana, under Mr. H. S. Price, interviewed by the Appraiser at Cheyenne, Wyoming, now stationed at Great Falls, Montana. Some of these districts are fairly close to

*American Cattle Producer, November, 1939. A copy of the Taylor Grazing Act is attached in the Appendix for study of other features.

the International Boundary, and the Appraiser suggests that the short grass stockmen avail themselves of the opportunity to view one of these districts in operation in Montana.

The county lands, embraced and operated by the Department of the Interior, are comparable to some of our municipal lands, and the counties benefit from such operation.

UNITED STATES DEPARTMENT OF THE INTERIOR— INDIAN SERVICE

The Indian Service of the United States Department of the Interior has a number of reservations throughout the far-western States upon which grazing by stockmen, other than tribesmen, is permitted.

The Service recognizes the principle of controlled grazing, and in the bidding for the rights of different allotments, the carrying capacity of each unit is recognized. Bids are called for a definite number of stock to be grazed upon a unit containing a specified number of acres at a rate per head for the season on the basis of either year long or summer grazing. The minimum total amount of the bid is also stated. The permittee is required to post a bond or other surety, and the stock must be of his ownership, which must be certified.

The grazing rates for example on the Blackfoot Indian Agency at Browning, Montana were advertised for a permit covering a three year period, which works out on an acre basis at about 15 cents per acre for year long grazing. On the basis of per head, the majority of the units work out about 30 cents per head per month or \$3.60 per head per year for cattle. For sheep it comes to a little over seven cents per head per month or 90 cents per head per year.

On most of these lands the carrying capacity is figured at six acres per sheep and 24 acres per cow for year long grazing. This land would be more comparable to our foothills range, lying as it does south of Cardston, across the International Boundary.

A copy of the regulations covering the Sale of Grazing Privileges on the Blackfeet Reservation, Montana, is attached in the Appendix of this Report, showing the carrying capacity of the different units, rates and minimum bids.

UNITED STATES—INDIAN SERVICE—MONTANA

It must be understood that many improvements are already present on these ranges, such as dams, windmills and improvements at springs. In many cases the allotments are completely fenced. On some units, such as on the Crow Indian Reservation south of Billings, in eastern Montana, one large unit is served by railway and shipping pen facilities and comprises approximately 363,000 acres.

This latter range, which could be compared to our short grass ranges, is completely fenced. It is a large unit, well watered, with considerable flat and hillside range and with

rail and road facilities as mentioned. It has also a large number of check plots, which were viewed by the Appraiser together with some experimental plots situated thereon, containing crested wheat grass. The grazing privileges here are also allotted on a basis of carrying capacity and a definite number of head per unit, with the object in view of giving a reasonable carry-over of forage from year to year.

The cost on this range will work out at slightly less than \$3.00 per head per season, year long grazing, average \$2.74.

The Indian Service naturally endeavours to receive as high a return as possible for the tribal funds for the benefit of the Indians, but it appears to the Appraiser that the Three Year Permit is of too short a time period from the stockman's viewpoint. It may lead to depletion of the range despite the best efforts of the Service to prevent such, as the stockman has to get his grazing value out in the three year period, with the possibility of being faced with a higher bid when this comes up for renewal. Also, if the bid is high, overgrazing may result in an effort to pay out on the grazing value of the forage.

The Indian Service, however, appears to be in close contact with the Division of Range Management of the same Department of Interior and with the Range Division of the Forest Service, by conferences on mutual problems surrounding grazing management, with the principle of controlled grazing as their policy.

It is suggested that our own Indian Service could make greater use of the findings of the Dominion Range Experiment Station.

UNITED STATES—STATE OF MONTANA

The State of Montana has approximately six million acres of State owned lands which are administered by the State Commissioner of Lands and the Board of State Lands Commissioners. The amount of land which has reverted to the State and which has been under cultivation amounts to approximately some 700,000 acres.

There are no regulations covering the leasing of State lands, except as set forth by State Statute. In Montana, the State lands were formerly leased for a period of five years, but with the enactment of the Act creating the Montana State Grass Conservation Commission the period of lease was raised to 10 years in the spring of 1939. This was quite an advanced step in security of tenure, and conforms with the period of the Taylor Grazing Act and the 10 year permits of the National Forest Service. Thus they have recognized the importance of the security of tenure to the stockmen in their business.

The leases are secured by competitive bid, though the Commissioner recognizes the prior right to renewal of the former lessee. If an individual is willing to pay more for the lease than it could be possibly worth he certainly will not receive it. The question of commensurate property in the leasing of state lands is recognized.

Lands which are leased for cultivation are required to have 50% of the acreage in summerfallow each year. Provision is also made that if a grazing lease is cultivated without permission, the lessee becomes liable for twice the agricultural rental in addition to the regular grazing rental.

There are no arrears of rental in Montana, as the Board of Land Commissioners, under drought and other adverse conditions, cut the current rentals 50% where necessary.

All rentals are payable in advance on December 15th and if unpaid by February 1st following, the lease is automatically cancelled by February 28th of that year. Reasonable extension is given, however, on current rentals under extenuating circumstances.

The rates of rental of State lands vary and are based upon the appraisal value from six to 18 cents per acre depending upon the carrying capacity, with an average of from nine to 10 cents per acre.

It is pointed out that the privilege of selection of State lands took place in Montana as elsewhere and a great number of these lands have been blocked together, though some are isolated.

The poorer and less desirable grazing lands, except those which have reverted to the counties for taxes, are still in Federal hands, and have been largely those which constituted the former Public Domain. Lands in private hands, mostly in the status of absentee owners or railway corporation lands together with some trust company lands, make up the balance in many sections of the State, which now are being embraced in the Taylor Grazing Act Districts.

In many cases the State lands controlled water or a certain amount of other lands by reason of their position, and have been able to rent for greater amounts than the Public Domain lands will demand under proper grazing control.

The proper appraisal of all State lands in Montana has been handicapped in the past by too small a field force being available to do this most necessary work.

MONTANA GRASS CONSERVATION COMMISSION

The enactment of the Montana Grass Conservation Commission, due principally to the efforts of the Montana Stock Growers' Association has been a very advanced step in the conservation problem of the State of Montana in the opinion of the Appraiser.

This act is for the purpose as described thus in its preamble:

An Act for the purpose of providing for the Conservation, Protection, Restoration, and proper Utilization of Grass and Forage Resources of the State of Montana as a means of Restoration and Maintenance of the Prosperity and General Welfare of the State.

The Commission consists of five members made up of the following: One from the Montana Stock Growers' Association,

one from the Montana Woolgrowers' Association, one from the County Commissioner's Association, one from the State Grazing Districts, and one, a member to represent the general public, familiar with the livestock industry.

They are appointed by the Governor of the State for a term of four years, at the beginning, with other time appointments to follow. The Governor has been fortunate in the selection of able, conservation-minded men, to act as members of this very important Commission.

The Act provides for co-operation with Federal agencies etc., in the setting up of State Grazing Districts; 10 year leases and permits; exchange of lands; creation of State Grass Conservation Fund; undertaking reseeding of depleted range areas; or abandoned lands, purchase or otherwise, to acquire possession of land for grazing purposes; and providing for the preservation of range for wild life.

It also provides for the Commission to act in an advisory capacity to the Board of State Land Commissioners and board of County Commissioners for the purpose of working out uniform plans for the use of lands either in or outside grazing districts, in conformity with recognized conservation and stabilization policies.

It forces the rental by grazing districts of the lease of vacant State lands within the district at a reasonable rental, and re-appraises the lands, etc.

The State Grass Conservation fund is made up of a levy of per animal unit based upon the number of animal units which the districts issue per year. This is to defray the expenses of the Commission, repay the initial appropriation from the State, and the creation of a fund for the Commission to use for the purposes outlined in the Act.

The primary purpose of the Act, in addition to the matter of Conservation, is to secure uniformity, with the provisions of the Taylor Grazing Act, and facilitate the co-operation of State with the Federal Department of the Interior in the workings of the Taylor Grazing Act. This lends itself to the land problems of the counties which are in the status of sub-marginal lands of our municipalities or improvement districts.

The Commission also acts in the adjustment of rates charged in the grazing districts.

Conservation and rehabilitation of the grass resources of the State of Montana, as well as greater stability for the livestock industry of the State, together with uniformity of action, has received a decided impetus as a result of the creation of this Commission.

As we have many similar problems in the Province of Alberta, the results of past land policies, the Appraiser, elsewhere in this Report, recommends the setting up of a somewhat similar Commission in Alberta.

A copy of the bill creating the Montana Grass Conservation Commission, through the courtesy of the State Land Commis-

sioner for the State of Montana, together with a copy of State Lease Form, is attached in the Appendix to this Report.

The State of Wyoming was one of the States visited in the fall of 1939 by the Appraiser in the course of his survey, to determine comparative costs of production figures, and some ideas on their methods of operations in the grazing industry of that State, which is its largest industry.

The following is quoted, in order to give the stockman here some idea of its size, and of the three principal agencies which operate the major portion of the grazing lands of the State, the State of Wyoming, The United States Forest Service and the Grazing Administration of the Federal Department of the Interior, under the Taylor Grazing Act and in co-operation with the State under Federal and State legislation relating to that Act.

STATE OF WYOMING—GENERAL

STATE OF WYOMING—GRAZING LANDS

The lands of the State that have been classified as best adapted for grazing purposes by the Geological Survey of the Department of the Interior included approximately 43,657,000 acres. This does not include the National Forests which are used largely for grazing. A considerable portion of the areas classified as grazing land would be productive crop land except for one or more factors; rough or stony surface features; coarse or tight soil texture, alkalinity of the soil, shortness of the growing season, inadequate annual precipitation or lack of irrigation water.

TAYLOR GRAZING ACT

A large proportion of the grazing lands situated in the western two-thirds of the State exclusive of the National Forests is owned by the Federal Government. An attempt to stabilize the livestock industry which is dependent largely upon the use of public domain, and to prevent soil deterioration, the Federal Grazing Administration has organized five grazing districts within Wyoming under the Taylor Grazing Act as amended June 26th, 1936. Within these five districts there is a marked concentration of federally owned grazing lands.

NATIONAL FORESTS AND NATIONAL PARKS

Excluding the Yellowstone National Park, the national forests and parks of Wyoming contain approximately 9,098,000 acres, a trifle over 15% of the total area of the State. In general they occupy the rough and mountainous areas having relatively high altitudes. The national forests are useful to the State chiefly in four ways. They tend to stabilize the supply of water for irrigation by protecting the watersheds; they are the most important potential sources of our future timber supply; they furnish pasturage for thousands of head of cattle, sheep and wild game during the grazing season; they are useful for recreational purposes. The grazing of livestock is done by a system of permits issued by the Forest Service.*

*Bulletin 228, University of Wyoming, Agricultural Experiment Station, and the U.S.D.A. Bureau of Agricultural Economics, "Type of Farming and Ranching Areas in Wyoming."

The State of Wyoming owns, under various educational and school grants from the Federal Government, 3,606,820.05 acres of State land.

The privilege of "selection" of State lands with the Federal Government was largely exercised, as mentioned elsewhere, by the State of Wyoming in cases where sections 16 and 36 were isolated or inaccessible, so that there is a marked concentration of State lands in some counties which are favourably situated.

The rates vary from fourth class grazing land, which has been unleased for a period of five years at a minimum of 2½ cents per acre in all counties. In the drier counties the rates vary from five cents to a maximum of 14 cents per acre on dry lands, while those with water run from 7½ cents per acre to 21 cents.

In other counties the rates, due to being more advantageously situated, run from 7½ cents per acre to 21 cents for dry land, and from 7½ to 10 cents to a maximum of 28 cents per acre for lands with water.

These rates are all based upon lands which still remain unclassified grazing lands. The State Commissioner under the Statute must have all lands appraised and classified, and this is being done as rapidly as circumstances will allow.

The term of lease was formerly five years but this was amended in 1937 to a maximum term of 10 years to conform with the Taylor Grazing Act. All leases are now issued with provisos, making them subject to exchange for other lands by virtue of the Taylor Grazing Act.

They may be sub-leased, but cannot be sub-leased for a cash consideration in excess of rental paid the State, unless half of such excess be paid the State.

All State lands under lease are subject to sale, but subject to the lessee's consent, and as the minimum sale value, set by the Constitution of the State of Wyoming, is \$10.00 per acre, not many parcels of grazing lands are sold, due to the price.

PAYMENT OF RENTALS

There are no arrears of rentals upon State lands in the State of Wyoming, for, like Montana, the Board of Lands Commissioners promptly cuts the current rentals 50% when emergency drought conditions were shown to prevail. The rentals are due and payable 90 days preceding the beginning of the rental year, and if unpaid within 30 days following, the Commissioner gives a further 30 days, when, if still unpaid, the lease is automatically cancelled.

As an assistance to the office of the State Lands Commissioner, the State is split, with some lands becoming due January 1st, others February 1st, and the balance on March 1st. By this procedure billing and collecting from the administration's standpoint is facilitated.

The present lessee has the priority for renewal but if a higher competitive bid is received, and such bid is not considered unreasonable, the Board determines a fair rate under such circumstances.

PRICE FACTOR

At the time of the Appraiser's interview with the State Commissioner of Lands, he was informed that a delegation from the Wyoming Stock Growers' Association had then recently waited upon him asking for the rates to be set upon a similar system to that prevailing in the National Forests, which would take the price factor into consideration. He stated that he was taking the matter into consideration, and was very much interested in the Appraiser's investigation into the short grass stock growers' proposals. He stated that such an investigation added weight to the discussion which had taken place between the Wyoming Stock Growers' delegations and himself, and that undoubtedly the fact that they were asking for such consideration would add weight to the reasonableness of the short grass stock growers' requests.

Commissioner J. B. Griffith kindly supplied the Appraiser with a copy of lease application, lease form, application to purchase, and extract of the law governing leasing of State Lands of the State of Wyoming, which are attached in the Appendix.

MONTANA AND WYOMING—GENERAL

In travelling through the states of Montana and Wyoming, one, who is interested in the stock business, will be struck by the fact that the maximum use is being made of the valleys for the raising of forage crops, particularly alfalfa. This is done by small irrigation schemes, both private and with Government assistance, in an endeavour to attain balanced units, with every available drop of water from creeks and coulees being made use of.

As mentioned before, the calf crop percentage appears to run much higher on a greater number of ranches than on ours, thus cutting the costs of production. Natural deficiency in the native range forage is made up by supplemental feeds, as well as by the greater use of alfalfa by the rancher. In discussing this phase with Dr. J. C. Hargrave, Dominion Veterinarian, at Calgary, he pointed out that the use of alfalfa will offset the natural mineral deficiency to a large extent, so that a great many short grass stockmen here appear to be gravely handicapped, if they have not a small irrigation scheme upon which to grow some alfalfa, especially if they are not feeding some mineral supplement. This has an effect upon their calf crop percentage, especially in dry years.

Conservation appears to be the keynote of the Federal agencies operating in these states, along with the recognized use of controlled grazing in such a programme, together with the basis of value on a line of carrying capacity of the range. The State Agencies have been slower to recognize the value of such policies. Montana, however, with its Montana State Grass Conservation Commission, is a decided advance, though both States still adhere to a rate basis of per acre, when it has been shown that a flat rate per acre for grazing lands cannot always be fair, due to many factors before mentioned, such as topography, mar-

ket prices of live stock, etc. It would appear that a Conservation Commission in Wyoming would be a decided advance in that state in consideration of their problems.

The ten year lease and permit is a decided advance over the annual permit, or a five year grazing lease, to the stockman in planning his operations, but it was generally admitted that the twenty or twenty-one year lease was a more ideal period of time for the stockman to have in order to properly plan and finance his business. It would appear that a longer lease and permit period will be the inevitable result there, as they further experience the stability of even the ten year period in the live-stock industries of those states, as compared to those periods in vogue there in the past.

The Appraiser was reliably informed that during the winter of 1938-39 in Eastern Montana and Eastern Wyoming, quite a number of ranch herds were successfully wintered upon cheat grass; others upon Russian thistle, when winter feed presented a problem, due to extreme drought.

The stockmen here have often raised the question of the grazing value of crested wheat grass or brome in comparison with the native range grasses.

The Appraiser, when accompanied by Mr. George Ross, visited the Judith Basin Experiment Station at Mocassin, Montana. They are conducting an interesting experiment there. Crested wheat grass, brome, and native grasses are each being grazed at the rate of 23.6 acres per steer. They are grazed upon these grasses as long as they continue to make gains. This is dry land range.

The 1939 results are as follows:

	No. Days Grazed	Gain per Steer
Crested wheat grass.....	120	262 lbs.
Brome grass	110	288 lbs.
Native grass	158	297 lbs.

These results for 1939 show that the greatest gains are made from native grasses, but that a longer grazing period is required to make such gain than from other grasses. The greatest gain in the shortest length of time is from brome grass, with the lowest being made by crested wheat grass, but over a shorter grazing period.

It appears from this that greater gains over a longer period can be made upon native grass, but that crested wheat grass and brome will give good gains for a shorter period. The experiment is continuing and should be watched by the short grass stockman.

STATE OF COLORADO

The same remarks touching on selection of State lands made with regard to Montana and Wyoming apply to Colorado. The State lands are controlled by the State Board of Land Commissioners appointed by the Governor.

These lands are leased for a period of five years, with the privilege of renewal at a rate of 8 cents per acre where the land is dry and no stock water is available. However, where

the land contains open water, lakes, springs or creeks that would supply water, the rate is 12 cents per acre. The majority of the lands would run from 8 to 10 cents per acre. There is no limit to the amount of State lease an individual or corporation may lease for grazing purposes.

The Board from time to time offers State lands for sale after appraisal, with the sale by auction, and the first bid must equal the appraised price.

The feature of the Colorado State Grazing Lease is the renewal feature, which amounts to a closed lease for the period of tenure stated therein.

STATE OF ARIZONA

The State of Arizona leases its State lands also for a period of five years. The Arizona Cattle Growers' Association has repeatedly endeavoured to have the law changed to give a ten year lease period, but so far without success. The lease carries a right of renewal except in a few cases where conflicts occur.

When the Homestead Act was operative, a homesteader had the prior right to lease sections adjoining his homestead. This Act, however, is no longer in force.

Arizona state lands are leased for 3 cents per acre, and are sold at a minimum of \$3.00 per acre, with terms of 1% cash and 4% upon execution of the sale, the remainder being due in 38 annual payments or the entire amount payable at any time.

STATE OF NEW MEXICO

New Mexico State lands are leased for a period of five years without advertisement or public auction during that time.

Prior to 1921 the lease rental was 5 cents per acre but since then they have been leased at a rental of 3 cents per acre minimum, but this may be increased if the Commissioner of Lands deems these to be of greater value.

They may be sold at a minimum of \$3.00 or \$5.00 depending upon their location, either east or west of the range line between ranges 18 and 19 east in that State, the lower minimum prevailing west of that range line.

As mentioned elsewhere in this Report, sections 16, 36, 2 and 32 in New Mexico and Arizona are the school sections, unless otherwise appropriated at the time the laws granting them were made, when the State received the right to make selections in lieu thereof.

A large portion of New Mexico contains short grass land, blue grama, etc., while only a small portion of Arizona can be classified as such, with much of each State being in the desert classification.

In discussing State lands in these two States, as well as in Texas, Bulletin No. 68, U.S.D.A., stated in 1928 as follows:

Considerable criticism of the State administration of land was heard because of its failure to cancel or reduce fees at a time when, owing to the drought, there was no grass. A considerable number of leases were dropped because of inability to pay the fees. Many ranchmen stated that a lease of from 3 to 5 cents an acre on State land during the drought and recent depression was unfair and should have been waived or a re-appraisal made of the range land, and the lease rate based on the quantity of forage available. It would be much more equitable to establish the lease prices on the basis of the grazing capacity of the land rather than a flat rate which disregards the grazing value of the land.

The lessee is permitted to pay in advance, but any deferred payments must be covered by promissory notes covering such with two sureties, with interest at the rate of 8% per annum after maturity.

A copy of New Mexico Regulations is attached in the Appendix.

PROVINCE OF SASKATCHEWAN

The Appraiser visited the Province of Saskatchewan in the fall of 1939, inspected several Prairie Farm Rehabilitation Projects, the Matador Ranch Community Pasture, operated by the Saskatchewan Department of Agriculture, and interviewed provincial Government officials in Regina, as well as officials of the Prairie Farm Rehabilitation Act there.

The Experimental Farm at Swift Current was visited and Mr. L. B. Thomson, Superintendent, and Dr. S. E. Clarke, Dominion Government Agrostologist, were interviewed for information pertaining to this Report.

Government of Saskatchewan—Regulations

The Regulations covering grazing lands in the Province of Saskatchewan adhere very largely to the old Dominion Government regulations in force prior to the transfer to the provinces.

They recognize the tenure of twenty-one year leases in all larger leases in the province, giving the assurance of permanent tenure, if the regulations are adhered to. This gives the stockman an opportunity to plan his operations over a long term of years.

There is no cancellation clause except where the Government should require the lands of the lease or any portion thereof for the purposes of irrigation, when provision is made for such under a three year cancellation clause.

There is a limit to the amount of acreage to be held by any one individual or by corporations, etc., of 25,000 acres.

The Department requires the land to be used on the basis of one head of cattle per 30 acres, but this may be increased upon inspection or, in the case of overgrazing, reduced. A stock declaration is required after the first year of operation and then, at such time as the Department may require, the stock being the property of the lessee. No annual stock declaration is required.

Provision is made for the consolidation of leases by the same individual or corporation under one lease number, and the Department endeavours to block these lands in units of not less than one section.

School Lands

Provision is made for the inclusion of school lands within or adjacent to a lease, to be included in the same lease under the same rental and conditions as other provincial lands, the revenue going to school land revenue. Other school lands are rented at the rate of 4 cents per acre per annum for a period of five years, while under the provision previously mentioned the lease may be for either 21 or 42 years.

Rental

The rental upon the twenty-one year leases is set at a minimum of 2 cents per acre, with provision in the regulations for an adjustment of the rental rate at the 5th, 10th, 15th and 20th years of the leases, but if no revision be made, the rate previously in force shall continue until the next revision date.

The due date for the payment of such rental is November 1st, payable in advance for the succeeding year, and if unpaid at the end of six months the lease is automatically cancelled, and if the lessee still be in possession he is in trespass. It may be re-instated, however, upon payment of rental and penalties fixed by the Minister.

Taxes

The regulations provide that by the first of January of each year the lessee must furnish tax receipts to the Department, to demonstrate that his school, municipal, or improvement district taxes are paid for the year just concluded, to keep his lease in good standing. The Minister is authorized, however, to accept a certificate stating that the Department of Municipal Affairs, Municipality, or School District is willing to forego and defer payment for such year.

The Department of Municipal Affairs in Saskatchewan collects the improvement district taxes in Saskatchewan, separately, whereas in Alberta the above mentioned taxes upon grazing leases are included in the rental by the Department of Lands and Mines.

Feed

The lessee is entitled to all feed and hay upon his leasehold, but has no right to barter or sell hay, unless upon the payment of \$1.00 per ton to the Government.

The lessee has the right to cultivate any portion of his leasehold for the purpose of growing winter feed but cannot barter or sell same.

42 Year Leases

Provision is made in the regulations for the issuance of 42 year leases upon a minimum of two sections of land or a maximum of 70 sections or 42,800 acres.

This is almost an unrestricted form of lease, in which the lessee may take in stock other than his own, cultivate, cut hay and sell feed, etc., without payment of other fees, but a reasonable proportion of the stock must be owned by the lessee.

The rental on this type of lease is at the rate of \$5.00 per quarter section or fraction, or slightly over three cents per acre, payable in advance.

Provision is made for inspection and the number of stock may be curtailed, together with the curtailment of the amount of cultivation, or the sale of hay or feed, if necessary. When required by the Department a return must from time to time be filed showing the number of owned stock, other owners, amount of feed sold or disposed of, etc., and the value of same.

There are ten of these 42 year leases in the province, the idea of such being to give a lease somewhat similar to an Australian 42 year lease; give more stability to the stockman, and assist the small man to put his stock with the large rancher where other pasture is not available, and at a higher rental provide greater revenue for the Department.

Small Parcels

Small areas of grazing land are leased for a period of five years at a rental of \$4.00 per quarter section, or permits for one year at the same rate of rental. These are lands of insufficient area to be used for ranching purposes, but may be termed farm pastures.

Right of Renewal

The regulations cover the right of renewal by the lessee, recognizing his priority for such during the last year of the existing lease, but the prior right of renewal expires two months after the expiration of the existing lease, unless the lessee has exercised such right and paid his rental in advance for the year following. These regulations are under review at the present time but have not yet been revised by the Department of Natural Resources.

A copy of these present regulations, as they appeared in the Saskatchewan Gazette, issue of April 16th, 1934, pages 14 to 19, inclusive, are attached in the Appendix of this Report.

Arrears, Etc.

Due to prevailing drought conditions existing prior to and at that time, on May 1st, 1937, the Government of the Province of Saskatchewan reduced the rental rate from 2 cents to 1 cent per acre until November 1st, 1940.

Those lessees whose rentals were in good standing as of May 1st, 1937, in other words, who had no arrears, received a half year's grazing free, followed by the reduced rental rate of 1 cent instead of 2 cents per acre.

Those lessees who were in arrears as a result of drought conditions and the over-grazed and depleted state of the range,

combined with low prevailing livestock prices, had their arrears cut 50% and were given two years, or until April 30th, 1939, to pay them.

The Board of Revenue Commissioners of the province extended this period to October 31st, 1939, upon representations of the stockmen so affected, and the Appraiser presumes that a further extension has been made since then of six months, for those who still have some arrears and have made an honest effort to pay them up. No interest has been charged upon these overdue arrears.

These concessions appear, under the circumstances, to have been of great assistance to the stockman.

The Appraiser is of the opinion, however, that once a concession is made by the lowering or cutting of the outstanding arrears on grazing leases, that it sometimes becomes more difficult to collect the balance due after such a reduction has been granted. Many individuals are inclined to be slow in such payments, in the hopes that the Government may make still further reductions, but the vast majority will pay if they are able to do so.

If any tax is fair, equitable and within the ability of the individual to pay, as well as levied at a convenient time, the Appraiser's opinion is that such will be paid. If it is unfair, inequitable, or levied at an inconvenient time to the taxpayer, under the then prevailing circumstances, delinquency and even boycott may occur.

The grazing lease rental notices go out in Saskatchewan to the lessees as early as possible before the due date of payment, which is November 1st. The line of reasoning is that under the United States tariff quotas, a large portion of ranch cattle move from Saskatchewan before or about that time. If the rancher has the money, when billed for his lease, it is easier for him to pay. If the due date is at a period when he has not received his sale money, the notice is put away, someone else may get the money and delinquency may occur. The Appraiser was informed that in March, 1939, less than 5% of the current rentals remained unpaid at that time.

Taxes on Grazing Leases

The taxes upon grazing leases in the Province of Saskatchewan in local improvement districts which are operated, as in Alberta, by the Provincial Government, are as follows: Local Improvement Tax, $3\frac{1}{8}$ cents per acre; Leases, $\frac{3}{4}$ cent per acre; Sanatoria Tax, $\frac{3}{4}$ cent per acre; Leases, $\frac{1}{8}$ cent per acre; Public Revenue Tax, 2 cents per acre; Leases, $\frac{1}{5}$ cent per acre. This works out to a total of improvement district taxes of \$1.72 per quarter section per annum, or slightly more than 1 cent per acre.

The rancher in the short grass area in Saskatchewan has had, therefore, since 1937, his arrears cut 50% on his rental, and the annual rate cut 50%—from 2 cents to 1 cent per acre. If located in an improvement district, his taxes amounted to 1 cent per acre, making a total of slightly over 2 cents per acre cost per annum on his lease. In the case of arrears he has had two years to pay these up with one six months' extension since that time.

Regarding the matter of arrears of taxes due to drought conditions, in a general adjustment of the tax arrears burden, the Appraiser's understanding is that if the lessee paid up the equivalent of two years' taxes, then the Government or municipality wiped off three years' tax arrears, which meant that where some lessees were in good standing they received a cash refund, or credit on future levies.

It must be pointed out, however, that should the lease be located in a school district or municipality, that the tax rate would be based upon a per acre assessment and mill rate thereon. The School Assessment Act of Saskatchewan provides that upon grazing leases held from the Crown, they may be assessed and taxed at an assessed value to a maximum of \$2.00 per acre. Most school districts and municipalities are reluctant to assess below the maximum assessed value of \$2.00 per acre, and therein lies the greatest complaint of the stockman in Saskatchewan. If his lease lies, therefore, in an improvement district and also a school district the Saskatchewan stockman pays, at the moment, 1 cent rental, 1 cent improvement taxes and the taxes for school purposes based upon an assessed value of \$2.00 per acre, whether the latter is its real economic value or not.

The \$2.00 per acre assessment for grazing lands by school districts, etc., is the main point of contention in the matter of rates and taxes on grazing leases with which the Saskatchewan Stock Growers' Association is concerned, according to Mr. Olaf Olafson, Vice-President of the Association.

General

The Grazing Regulations of the Province of Saskatchewan provide possibly much more stability to the stockmen of that province than do the present regulations here in Alberta, though amendments embodying many of their features are being introduced into Alberta as a result of a meeting between the Minister and a delegation of the Western Stock Growers' Association, held early this year.

One outstanding feature is the elimination of the annual stock return on the leases, the amount of the stock carried being left to the judgment of the individual stockman. The statute, however, still provides a minimum number based on one head to 30 acres, which was always a weakness of the old Dominion regulations. If a minimum number is stated at all then a maximum number to be carried should also be stated, as the condition of many of the ranges in Saskatchewan and Alberta from over-grazing is a result of that minimum number which was originally stated in the regulations. The elimination of the annual stock return is similar to requirements in the Western States, where a statement, sworn under oath, may be required at such times as the Department may see fit.

The stockman in Saskatchewan, on the whole, appears to have been treated very fairly, in the matter of being assisted to meet conditions as a result of drought and its attendant troubles such as over-grazing. The weakness of the regulations in Saskatchewan, however, appears to the Appraiser to be the rental

upon a per acre basis, grass or no grass. This has led to delinquency in payment through no fault of the stockman and as a result, arrears and adjustments by succeeding governments, if the current rates are not promptly adjusted under such conditions. This statement applies equally in Alberta or elsewhere, wherever the rental rates are based upon a per acre basis regardless of the carrying capacity of the forage thereon. As shown elsewhere in this Report, there can be plenty of acres and no grass, when value cannot be given for the rental charged under such flat rates.

Matador Ranch Community Pasture

The Matador Ranch Community Pasture, operated by the Saskatchewan Department of Agriculture since 1922, was inspected by the Appraiser.

This ranch, situated north of Swift Current on the South Saskatchewan River, lies along the north bank of the river and consists of some 138,000 acres of excellent grazing land. It was formerly leased by the Matador Land and Cattle Company of Denver, Colorado, from the Dominion Government. Upon the Matador Company withdrawing from Canadian operations, due to the Fordney-McCumber Tariff Act at that time, the province took over these lands as a community pasture and has operated same ever since, under a manager and Government range riders.

The original rates were 50 cents per head per month for cattle and \$1.00 per head per month for horses. However, these have been reduced now to 40 cents per head per month for cattle and 50 cents per head per month for horses.

The average number of stock run on this ranch runs from 2,500 head to 6,000 with an average number per season at about 4,000 head. The number on the ranch during the 1939 season was approximately 2,500 head. The lower number of stock being run was largely due to the vast reduction in livestock numbers in the surrounding districts during drought years through the Dominion Government Voluntary Marketing Scheme. The forage on the ranch in the fall of 1939 was the best stand and with the largest carry-over of old forage that the Appraiser had ever seen on this range.

The stock here are made up of about 50% farmers' stock and about 50% ranchers', the ranchers representing small stockmen each owning from 200 to 500 head of cattle.

This ranch has always made its way, paying educational and school taxes on lands in school districts, but being Crown operated no rental is paid the Department of Natural Resources by the Department of Agriculture for the use of the land.

Prairie Farm Rehabilitation Act—P.F.R.A.

As already mentioned, the Appraiser viewed several projects of the Prairie Farm Rehabilitation Act in Saskatchewan and discussed range problems with officials of that organization.

It is not necessary to review here the many phases of operation under this Act in Saskatchewan, and to a lesser extent in

Manitoba and Alberta—in stock-watering dams, irrigation projects, community pastures, reseeding operations of range land and movement of settlers under its rehabilitation operations—except some phases as they have a bearing upon this Report.

The Land Utilization Branch has about one million acres of land in the Province of Saskatchewan in community pastures, taken over from former range land and abandoned farm lands in sub-marginal districts.

In Saskatchewan, the Act, in agreement with the Provincial Government, takes title to the lands with which it deals, thus giving it complete control; so that, for example, after the large expenditures of Dominion Government funds have been made for the permanent rehabilitation of these lands in question, control is retained in order that improper use of the land cannot be made after it has been placed in pasture as its best utilization.

A great deal of very excellent work has been accomplished in the Province of Saskatchewan under this Act with the thousands of acres, which have been reseeded with crested wheat grass to hold drifting and denuded soils. Many of these lands the Appraiser was familiar with under former conditions. This work is done in co-operation with the Experimental Farms Branch of the Dominion Department of Agriculture.

An example of the necessity for a long term of tenure and control in the rehabilitation of lands is cited here. The lands, which have appeared in many periodicals in pictures of complete desolation with soil heaped high as the house and the old grain separator almost buried in sand, have been completely rehabilitated with crested wheat grass. The soil has fibre and it is now good range land instead of a heap of drifting sand. The Act, however, only had a short term lease on this land when the rehabilitation was started. The trust company which owned the land was so pleased with the results that they immediately expressed the desire to have control returned to them so that it could be farmed. Had this been done, the rehabilitation work of years would have been sacrificed and the same mistakes, in the same vicious circle, started all over again. The Department, however, could not afford to lose such an outstanding example and control was retained by the Department.

The community pastures under the P.F.R.A. are all fenced, and are well watered with stock-watering dams or improved natural stock water. The pastures are operated by a resident manager, made responsible under the Act, and all fees go to the Department with the manager's salary paid as a Government employee. Each pasture has a community grazing association composed of the individuals running stock thereon. An example of such co-operation is attached in the Appendix.

The Act's bull policy with regard to these pastures is that the Department will supply pure bred bulls for the first three years' operations, then they will supply an equal number to that supplied by the Association for the next three years, and following that the Association is responsible for supplying their own pure bred bulls.

The rates on these pastures were originally based upon the Matador Ranch rate of 50 cents per head per month for cattle, as it was a Saskatchewan operation, with a rate of 75 cents per head per month for horses.

The original rate of 50 cents per head per month for the Matador Ranch Pasture, upon which the P.F.R.A. rate was based, was the rate suggested by the Appraiser, when an employee of the Saskatchewan Government, as being a fair one at that time. The only comparative rate then on the American Continent was the 50 cents per head per month rate which was being paid by Texas cattlemen for summer grazing in the State of Nebraska, and this was suggested as a possible fair rate to start with in Saskatchewan.

The now existing rate of P.F.R.A. pastures in that province is 25 cents per head per month for cattle, and 50 cents per head per month for horses. The Appraiser was informed that all grazing fees for the year 1938 had been collected, and that the pastures had paid their operating and maintenance costs.

The Appraiser was informed that these rates made allowance for fence maintenance for a thirty year period, as they were well constructed, upon treated posts. No allowance in the rates, however, has been made for cost of dams, etc., which were constructed under Dominion expenditure as a drought relief measure, the benefit being better utilization of the range, placing the land upon a productive basis, rather than such moneys being paid as direct relief to the residents of districts who worked upon construction of same.

It would appear, however, that unless there is a loading charge included in such grazing fees in these pastures, for at least a proportion of such capital costs, the rancher in Saskatchewan and Alberta, operating upon leased land with a large capital expenditure in fences, dams, etc., is being discriminated against, when he has not the benefit of use of such community pastures and prevailing rates, as a means of lowering his costs of production, which are available to those stockmen in the vicinity of such pastures.

Some advantages of these pastures are a uniform bull policy, controlled grazing methods, proper land utilization and the advantages of a co-operative marketing policy, with ultimate objective of a uniform quality to be turned off from such pastures.

It appears to the Appraiser that if the ultimate objective is to be reached the Act is faced with the fact that it must determine, in addition to the kind of bulls used, the kind and quality of stock grazed thereon, under the advantages of controlled grazing, etc.

It appears, also, that an ultimate and definite livestock policy for such pastures will have to be determined, if the maximum use under controlled grazing methods is to be achieved; namely, large numbers of uniform quality livestock coming off grass, and the maximum utilization of the forage thereon. This is especially true after a long period of drought with depleted numbers of livestock owned by the individuals using such pas-

tures. Therefore, a policy of financial assistance to such individuals in the matter of breeding stock of proper quality must be faced if the ultimate objective is to be achieved, in addition to bull assistance.

This has had to be done in the Western United States by the Federal Livestock loans up to the sum of \$5,000 to assist in the rehabilitation of stockmen in drought stricken areas, where the Taylor Grazing Act is operative on what was formerly the public domain.

If we expect the individual stockman operating upon leased lands to cull his stock to give quality, and thereby cut costs of production, then the individual, operating in government owned and controlled pastures, must be subjected to the same culling process, as he has lower costs of production than the first mentioned. As the government has control of such pastures, it appears that the same culling process must be applied. The uniformity of Argentine beef was not built up upon bull policy alone, but in combination with good, uniform females as well to establish a foundation. A uniform standardized product is essential if quality is to be emphasized to the ultimate consumer.

These remarks with regard to the P.F.R.A. pastures are equally applicable to the community pastures and head tax districts, operated in this province by the Special Areas Board in those areas.

Land Utilization Board

The Saskatchewan Land Utilization Board operates in conjunction with the Prairie Farm Rehabilitation Act in the acquisition and control of the titles to land selected for rehabilitation, transferring control to the Board and thence to the P.F.R.A. under the agreement, when the P.F.R.A., after survey, have decided upon acquisition and the setting up of a community pasture.

The Board is composed of the Deputy Ministers of the three provincial departments mainly concerned—Agriculture, Natural Resources and Municipal Affairs—under the chairmanship of Dr. F. Hedley Auld, Deputy Minister of Agriculture, with other members being the Professor of Soils and the Professor of Farm Economics of the University of Saskatchewan and three representatives of the P.F.R.A., two of their Land Utilization officials, and a legal representative. This makes a total membership of the Board of eight members.

This Board, after a thorough study of the districts in question, based upon the soil map of the province as well as all other available data and information from all sources, makes its decision of selective abandonment of the sub-marginal lands. Then it commences the tedious task of acquiring the titles for the land in question from the complex checkerboard pattern, which our past land policies have made. Thus the initial stages of the community pasture are begun.

It appears that such a Board as this is absolutely necessary if any worthwhile permanent solutions to the land rehabilitation and land utilization problems of the short grass areas are to be successfully worked out.

It must be pointed out, however, that the Board at the moment has temporarily ceased to acquire more lands, until the question of the proper disposal of bonded indebtedness of the school districts or former school districts, lying within the boundaries of the community pastures or proposed pastures, is settled.

The importance of the complete soil map of the province in rehabilitation and land utilization cannot be too strongly emphasized. As a result of the completion of a soil map of the Province of Saskatchewan by the Soils Department of the University of Saskatchewan, a complete re-assessment of the lands of the province is being made, to be spread over a period of six years. One sixth of the province is re-assessed each year, based upon the information of the soil map, and all other available data pertaining to the different sections of the province is being re-assessed.

Most valuable work has been done in Alberta by the Soils Department of the University of Alberta in their soils surveys; but it appears that they are handicapped by insufficient appropriations to complete more speedily this most valuable piece of work for the Province of Alberta, so that such information is especially available upon every piece of land in the settled areas of the province. Its importance is emphasized by the many uses which such information can be put to in the determination of governmental policies with regard to land when taken in conjunction with the all important factor, climate.

The Appraiser was informed by Mr. L. B. Thomson, Superintendent of the Dominion Experimental Station at Swift Current, Saskatchewan, of a valuable committee which has commenced to function in Saskatchewan. It is called "The Soil Conservation Committee." This is made up of Dominion, Provincial, municipal and mortgage association fieldmen. The object of this committee is the pooling of all information and the adoption of a uniform policy of attacking mutual agricultural problems. They have started out by taking two municipalities as experiment with this objective in view in dealing with agricultural pests, weeds, etc., and methods of cultivation, etc. This committee has much to warrant its permanency and is worthy of consideration and adoption by those interested in Alberta. The results of its workings in Saskatchewan can be watched by the short grass stockmen and the Department for its value to the Province of Alberta.

General

A considerable amount of space in this Report has been devoted to the regulations and operations of different agencies in the Province of Saskatchewan, but such is deemed to be of value to the short grass stockman of Alberta for purposes of comparison.

Saskatchewan and the State of Montana are also the closest neighbours, tied mutually with the short grass area of Alberta in soil, climatic, and rehabilitation factors. Another factor to be remembered is that in many cases stockmen in the Province of Alberta also operate outfits in Saskatchewan and Montana,

so that conditions in these two places are the most frequently referred to in comparison with our own. For these and other reasons it is therefore hoped that much value may be gleaned by the short grass stockmen from these reviews of the regulations covering the State of Montana and the Province of Saskatchewan.

Copies of procedure in setting up the P.F.R.A., the community pastures in Saskatchewan, regulations governing same, Grazing Association Agreement and Memorandum in regard to Operation of P.F.R.A., Land Utilization Department, are included in the Appendix of this Report.

In the case of the last named, it should be noted that lands for pasture purposes cannot be purchased but, under certain conditions, buildings may be and can be moved, or wrecked and used. Buildings, to be eligible for purchase, must be unencumbered and moving of same is without cost to settler.

Trading of lands for Crown lands is also provided for if they are municipally owned.

If settler decides against moving and avails himself of the rehabilitation service, he will be fenced in by a legal fence with proper gates for his use. As the lands in the area have been declared sub-marginal by the government, the municipalities will positively refuse to provide further fodder or seed relief. When a new location is decided upon the settler is moved free of cost to new location, with seed, etc.

In speaking of the necessity for rehabilitation, it might be pointed out that the soil survey of the south-western one-sixth of the Province of Saskatchewan by Professor Joel, at that time Professor of Soils at the University of Saskatchewan, showed some startling figures in 1931 to the effect that less than 50% of the soil covering this area was suitable for wheat growing, disregarding the climatic factor entirely.

It showed that 14% is light, 43% medium and 23% heavy. The balance of 20% consists of rough and alkaline lands. About twenty-five distinct soil types were observed in this area. Another grouping places this land as 48% smooth, 25% rolling and 27% hilly or rough. The burnt out soil areas constitute 11½% of the total.

These figures are significant as they have a bearing upon the short grass area of Alberta. Undoubtedly, when the soil survey of Alberta is completed for south Alberta, these figures will be closely approximated to Saskatchewan.

This is important. Only soil is considered in such survey and the importance of the climatic factor as well has been shown in this Report, to demonstrate the necessity of rehabilitation on a permanent scale of many of the lands embraced in the short grass area of Alberta.*

These facts have an important bearing upon all costs of production in such areas, including those of the short grass stockmen of Alberta, as a result of the haphazard system of land settlement and cultivation permitted in the past over Western Canada.

*Western Canada Drought Scrap Book, C. G. Anderson.

PROVINCE OF BRITISH COLUMBIA

Due to the wide geographical features in British Columbia, various kinds of leases are issued in that province, in order to cover the situation of valleys, mountains, forest range and interior plains.

The following from the Superintendent of Lands for the Province of British Columbia is quoted below:—

Vacant unreserved Crown lands within this Province may be acquired for grazing purposes by lease under the provisions of the "Land Act." Should the lands applied for be unsurveyed it is first necessary that the area be staked and advertised and the provisions of the "Land Act" governing the acquisition of unsurveyed areas by lease fully complied with. In this connection I am enclosing a synopsis of the "Land Act" and would particularly draw your attention to pages 10 and 11 thereof. (Attached in Appendix).

Composite leases, including grazing, may also be similarly applied for, the prevailing rates charged by this Department being as follows:—

Hay lands	50	cents	per	acre	per	annum
Agricultural lands.....	25	"	"	"	"	"
Balance of area	4	"	"	"	"	"
or	2	"	"	"	"	"
within former Railway Belt						

The minimum rental on any lease is \$5.00 and Statutory fee for the preparation of the lease of \$5.00 is also payable.

With regard to the leasing of lands formerly held by lease issued by the Dominion Government, I have to inform you that upon expiry of the Dominion lease, consideration is given by this Department to the issuance of a new lease under provincial regulations.

In addition to the leasing of Crown lands, grazing permits may be obtained under the provisions of the "Grazing Act" under the jurisdiction of our Forest Branch, and I am enclosing a copy of the regulations in respect to the issuance of such permits. (Attached in Appendix).

Permit Fees

- (a) Cattle at the rate of five cents a month each, with a maximum of fifty cents each per annum;
- (b) Horses at the rate of six and one-quarter cents a month each, with a maximum of sixty-two and one-half cents each per annum;
- (c) Sheep at the rate of one and one-quarter cents a month each, with a maximum of twelve and one-half cents each per annum.

The former Railway Belt mentioned, was within 20 miles on each side of the main line of the Canadian Pacific Railway, formerly administered by the Dominion Government, which leases were issued at the 2 cents per acre rate, and such continues to apply there. The balance of the grazing lands is rented at the flat rate of 4 cents per acre.

As shown in Bulletin, No. 10, attached in the Appendix, title or "Crown Grant" of grazing lands may be acquired by purchase; land wholly unfit for agricultural purposes, (third class lands) may be acquired at not less than \$1.00 per acre, or at such other higher price, established at the discretion of

the Minister. A certificate of improvement is required before title or Crown Grant is issued, along with the title fee.

An example of a ranch in British Columbia which operates upon all three classes of lands, Crown Grant, leased lands and grazing permit, is the Douglas Lake Cattle Company Limited, Douglas Lake, British Columbia. This ranch was organized in 1882 and incorporated in 1886. It is one of Canada's largest ranches with 140,000 acres of Crown grant land under fence, 50,000 acres of leased land and grazing permits on Crown ranges running a total of some 10,000 head of horses and beef cattle.

Under the Grazing Act the Minister of Lands may set up grazing districts on any Crown lands upon which grazing permits, mentioned previously, may be issued to stockmen at the rates before mentioned.

The maximum seasonal rate for cattle is 50 cents per head, 62½ cents for horses and 12½ cents for sheep, per annum. These rates compare favourably with those prevailing upon the forest ranges in the western States, and are considerably lower than on community ranges in either Alberta or Saskatchewan, cattle running, for example, on the Medicine Bow Forest in Wyoming costing about 54 cents per annum for such permit.

A portion of the fees from these permits is used for range improvements, such as improvements of water holes, fencing where necessary, etc.

These regulations were originally inaugurated by the former Commissioner of Grazing, Mr. D. P. McKenzie, now Inspector at the Dominion Range Experiment Station, Kamloops, based upon his experience with the United States Forest Service, some years ago.

No information is at present available for comparison, regarding the question of taxes on grazing lands in British Columbia.

GRAZING REGULATIONS—PROVINCE OF ALBERTA

As mentioned in the Preface of this Report, a committee of the Western Stock Growers' Association met with the Minister, the Honourable N. E. Tanner, early in 1940, asking that certain clauses of the Regulations be amended to give clarity and better assurance regarding permanency of tenure.

At this meeting, when the Deputy Minister and the Appraiser were also present, it was proposed to redraft the Regulations, after a round table discussion of the different phases involved had taken place.

The Minister assured the Association's Grazing Committee, that it was his desire to do anything reasonable in the redrafting of such which would lend clarity and give a clearer assurance of permanency to the industry, provided that the lessee at all times attempted to live up to the terms of his lease. Assurance was given that the Department was endeavouring to co-operate with the stockmen to the fullest possible extent in the solution of their problems.

The Grazing Regulations which the Association's Grazing Committee asked should be amended, were those adopted under Provincial Government Order in Council, No. 134-39, dated February 2nd, 1939. These Regulations already provided for the issuance of twenty year leases and prior right of renewal.

After redrafting same, they were submitted to the Western Stock Growers' Association for their approval before being presented for promulgation. Upon receipt of assurance from the Association that such were satisfactory, such amendments were passed by Order in Council, No. 321-40, dated March 15th, 1940 and incorporated in the Regulations.

Section 1 of the Regulations was amended by adding a new paragraph as follows:—

Any lease in good standing which has less than five years to run may be renewed if upon inspection by an official of the Department the lands described in such lease are found to be unfit for agricultural purposes.

This amendment gives, within five years of a lease's expiration, an opportunity to the lessee to apply for a new long term lease, and so be in a position to plan his future operations over a continued lengthy period of time, and thus removing a great deal of the uncertainty which previously accompanied the approach to an expiration date.

Section 7 was struck out and a new Section 7 substituted as follows:—

7. The lessee shall at all times perform, observe and comply with all the provisions of the Provincial Lands Act, 1939, and any other Act which may affect the proper utilization and conservation of the lands for the purpose for which they have been granted, or any regulations now made or which may at any time hereafter be made for such purpose.

The former Section 7, also embraced "the proper utilization and conservation of land or any resource affected by same." This was deemed at the meeting of the Association as perhaps unfair, in that it might not be possible for him to live up to such, because of the broadness of any resources, which might be oil or water development, reaching perhaps beyond his control. The present section deals with the proper utilization and conservation of the lands for which the lease is issued, namely, grazing.

Section 9 was amended by striking out the word "five", where it occurs therein and substituting the word "ten." The section now reads, "The lessee shall pay a yearly rent as may be fixed by the Minister and such yearly rent shall be subject to readjustment by the Minister at the end of each period of ten years of such lease, such rental to be commensurate with the value of the land and shall be payable yearly in advance."

This ten year period gives further assurance to the stockmen of a longer period of stable rentals, which permits them to plan their future business, so essential to a long term proposition.

Section 12 was amended by striking out the old clause and substituting the following:—

12. Any abandoned lands comprised within the leasehold which have been under cultivation shall be considered to be grazing lands, and the lessee shall conserve, reclaim and regrass these lands in such manner as the Minister may stipulate. The lessee may receive compensation for such conservation, reclamation and regrassing, the amount of such compensation to be in the discretion of the Minister.

This amendment makes it possible to compensate the lessee and so encourage him, in the reclamation and rehabilitation of reverted cultivation lands within his leasehold, of which in many cases there is a large amount, as pointed out elsewhere in this Report, resulting from our mistakes in land settlement policies in the past.

Section 13 was amended by striking out the original section and substituting therefor the following:—

13.—(a) Should the Minister, at any time during the term of the lease, think it to be in the public interest to withdraw the whole or any portion of the lands included therein, he may, on giving the lessee three years' notice, withdraw such lands; but any improvements owned by the lessee upon the lands so withdrawn may be removed by him or he shall be entitled to compensation therefor, the amount of such compensation to be decided by the Department.

(b) Before making any order for withdrawal the Minister shall cause written notice to be given to the Lessee that it is the intention so to do, upon the grounds set forth in such notice, unless within sixty days after service of such notice the lessee shows cause to the contrary.

(c) Service of such notice may be effected by mailing the same, duly registered, to the address or the last known address of the lessee, and in such case shall be deemed to have been made upon the day on which the notice reached the said address or in the due course of mail should have done so.

The amendment to Section 13, makes possible the taking of the lessee's representations into consideration, should it be deemed advisable in the public interest to withdraw portions of, or all the lease from its use by the lessee for grazing. It gives him also a reasonable time to present his representations which were not covered by the previous Section of the Regulations.

Section 27, which deals with hay upon the leasehold, was amended by adding a new paragraph as follows:—

The lessee may cut hay upon any part of the leasehold to be used exclusively for the wintering of his stock.

This paragraph was added to clarify the situation with regard to the lessee's privileges with regard to hay thereon and what use he might make of same.

Section 35, which covers the application fee, was struck out and a new section substituted as follows:—

35. A fee of \$5.00, together with the first year's rental, shall accompany each application for lease, which will be refunded if the application is refused.

This is to assure the Department that the application is a bona fide one, and overcomes considerable difficulty which the Department has encountered in the handling of grazing applications in the past.

Under Section 13 as amended, which covers the withdrawal at any time by the Minister, in the public interest, of any or all of the grazing lease, it is suggested, if such action should become necessary, that, if at all possible, such reductions should not be reduced in size below that of an economic ranch unit for the portion that remains.

Some things asked by the Western Stock Growers' delegation were beyond the powers and ability of the Minister to accede to, such as for instance a request that the maximum rate for grazing and taxes on grazing lands should not exceed 4 cents per acre. The Minister pointed out that it was beyond the scope of any Government to set such a maximum as exigencies of circumstances in the future, bearing upon such taxation, could not be foretold.

After explanation to the delegation, it was admitted by the members of same that some of their requests could not be granted, due to the difficulties experienced by the Department in the general administration of the Regulations.

The delegation was assured by the Minister that it was the policy of the Department to issue only long term grazing leases in the recognized stock ranching areas, but that in the general Regulations some leeway must be given for the purpose of issuing shorter term leases, depending upon districts and circumstances.

The outcome of this meeting of the Western Stock Growers' Association delegation with the Minister has been dealt with in the Association's Journal "The Canadian Cattleman", so that the Appraiser does not deem further comment necessary.

The lease regulations of other provinces of Canada, and states of the United States have been dealt with comprehensively in this Report, so that after a study of such, the Department of Lands and Mines and the stockmen may find many features which it may be to their mutual advantage to have embraced in the future regulations covering grazing lands in this province.

The annual stock return, required under Section 8 of the regulations on July 1st of each year, appears to be still viewed by quite a number of stockmen as a seeming unnecessary nuisance. The Province of Saskatchewan has eliminated this return and most of the States only require such a declaration at the end of the first year of a new lease and at such other times as may be required by the Department. Where a man has a number of leases under different ranch numbers, each requiring a declaration, considerable trouble may be experienced in apportioning his total stock over the different ranches which may be used as a whole unit.

The Appraiser suggests that if the annual stock return must be retained in the regulations, possibly only one declaration might be required from any one individual, firm, or cor-

poration, covering the total number of stock running upon a number of lease numbers but operated as a unit by the stockman.

As mentioned previously, it is the policy of the Department to issue only long term grazing leases in recognized ranching areas in order to lend the maximum of permanency so necessary to the industry.

However, in the matter of permanency of tenure, it must be pointed out that such permanency can only be assured, if the land is being put to its best economic use, if the rates are fair and equitable, commensurate with the return which the lessee gets for his product, and the equity of the lessor in the forage is fully protected by not being abused, damaged or totally destroyed by overgrazing.

It has been pointed out elsewhere in this Report, that a stockman may have a long term grazing lease at a flat rate per acre, which may be equitable under present climatic and forage conditions and prevailing market prices, but that he and his lease may be in jeopardy if cattle go to \$90.00 per head and the flat rate per acre for grazing remains the same. Also, the same condition may exist should such high prices prevail, but through drought there is practically no forage on his range, or it has become depleted by overgrazing practices.

In the first place, the lessor is not getting his fair return for the use of forage in the first high market prices and a flat rental per acre. In the second case, where through drought there is no forage, the lessor cannot give value for value received, while in the third case the lessee is abusing the land use for which he is not paying value commensurate with the damage done.

Therefore, in any of these cases, it is clear that the lessee's tenure, no matter what terms of years is stipulated in the lease, is in jeopardy unless a fairer means of basing the grazing lands use and rental is devised in place of the flat rental per acre, viz., a method which will take fully into consideration the variation in the carrying capacity of the land and the wide fluctuation in market prices with which the short grass stockmen have to contend, together with the climatic hazards which must be met over the area from year to year.

The proposal of the short grass Stock Growers' Association, outlined later in this Report, is deemed to be a step in the right direction to meet such conditions and to provide a more equitable means of levying the fees on grazing lands, under such conditions, as well as lending to the lessee that permanency of tenure so necessary for the successful conduct of his business.

Rates

The Province of Alberta, on the 31st of March, 1940, had 1,415 long term grazing leases comprising an area of 1,856,216.94 acres of grazing lands, under the jurisdiction of the Grazing Lands branch of the Department of Lands and Mines, with other large blocks of grazing lands controlled by other agencies such as Special Areas, etc.

Of the total area under lease, 627 leases comprising 940,-107.77 acres were leases issued by the Dominion Government issued for long term grazing periods in the Province of Alberta, prior to the transfer of the natural resources by the Dominion Government in 1930 to the western provinces. These leases still have an unexpired portion of their term to run before they come up for renewal under the provincial grazing regulations.

There were 788 long term grazing leases comprising a total of 916,109.77 acres in existence on the 31st of March, 1940, which had been issued by the Province of Alberta, under the provincial grazing regulations upon expired Dominion Government grazing leases or vacant provincial lands unsuitable for agriculture.

In 1930, at the time of the acquisition by the province of its natural resources, the Dominion was levying a flat grazing rental fee of 2 cents per acre, while the Province, through the Department of Municipal Affairs, levied in taxes upon such grazing leases an additional 2 cents per acre, making a total of 4 cents per acre rental and taxes.

These rates and conditions continued to prevail under provincial jurisdiction from 1930 to 1933, when upon representations of the stock growers of the south-east portion of the province, the principal short grass area, that the prevailing four cent rate of rental and taxes was not equitable due to prevailing low prices and drought conditions, a Grazing Commission was appointed to investigate such claims.

As a result of the work of this Commission, the rates in the south-east portion of the province were zoned and a reduction in the grazing rental was recommended and took place, though the 2 cents provincial tax remained the same.

In the Appraiser's opinion this was a decided improvement over the old flat rate prevailing, as an attempt to meet the special difficulties under which the grazing industry was labouring in the short grass area of the province. These zones were largely based upon the soil investigations and maps of Dr. Wyatt, of the Soils Department of the University of Alberta, whose careful investigations are of great value. However, by reason of the fact that the zones as set out followed township and range lines, there are several places where they are not altogether equitable. This was possibly due to the fact that, although general soil conditions are fairly good, sufficient consideration and study could not be given to the climatic factors in addition to the soil considerations.

The rental rate was reduced from 2 cents per acre in the different zones to \$1.60, \$2.10 and \$2.60 per quarter section of 160 acres of grazing lands. Including the tax of 2 cents per acre, this would make a total charge of 3 cents per acre or 3.31 cents and 3.63 cents per acre.

Outside of these zones, with the exception of the areas controlled by the Special Areas Board, known as the Special Areas, the total rate of 4 cents per acre prevailed, which included the 2 cents per acre tax levy by the Department of

Municipal Affairs, collected by the respective Departments, rental by Lands and Mines and tax levy by Department of Municipal Affairs.

These zoned reductions were of very considerable assistance to the industry in meeting the prevailing conditions of drought and extremely low prices prevailing for livestock products at that time. However, it must be pointed out, that in the light of general climatic conditions prevailing in certain of these zones, and the climatic data since available by the Dominion Range Station, that, in the Appraiser's opinion, such zones should have followed geographical lines rather than township and range lines in the setting out of such boundaries.

One example, previously mentioned under the heading of climate, will suffice, namely that of the extreme south-east corner of the province lying to the south and west of the Cypress Hills. This area, which comprised townships one to six, in ranges one to four, west of the 4th Meridian, was embraced in the zone which was reduced from 2 cents per acre rental to \$2.10 per quarter section per annum. The soil in this area can be classed as fairly good but records kept at the Dominion Range Experiment Station, situated in that area, clearly show that it is one of the driest, if not the driest, area in the short grass area.

In this same area, the effects of the chinook winds are also a factor which must be taken into consideration. These appear to lift west of the Lost River in the extreme south and on the west side of Lake Pawkowki, not striking again until closer to Medicine Hat. The result is that the chinook crusts the snow, adding to the winter hazards and feed costs, while the snow remains longer in the spring than to the west of these points mentioned. Therefore, in the light of such climatic information now available, it would appear that this area mentioned, when such zone was created, should possibly have been placed in the lowest zone, namely that in which the rental was reduced to \$1.60 per quarter section per annum rather than to the \$2.10 quarter section zone.

With the zone rates being established, it was necessary to deal with the accumulated arrears in these areas, which had resulted from the prolonged drought and the prevailing low market prices. Therefore, Order in Council, No. 257-35, in addition to the zone compromise outlined, authorized that in the event of any arrears being due and payable, the lessee could pay same by immediate payment of one-fourth of the amount due and distribute the balance over the next succeeding four years, all deferred payments to bear interest at the rate of 5%. This was to cover the period from and after January 1st, 1933, up to and including the 31st of December, 1937, in a compromise of rentals payable during that period.

To show the price conditions which prevailed, the audited cattle sales summary of Ranch, No. 8 if presented, from 1926 to 1938 inclusive, a period of 13 years, the high price received for their cattle was \$82.00 per head in 1929, with the low of \$22.00 per head in 1934. The average price for the 13 years was \$43.80 per head. From 1931 to 1938 was the low period with seven of the eight years being below average prices and with

1937 being just over the average, when \$44.00 per head was received. These prices are shown here to demonstrate what the stockman had to contend with during this period in low prices for his product as well as drought, and the example used is a ranch in the short grass area which consistently produces well bred, high quality cattle year in and year out.

Despite this zoned adjustment in the grazing rental rates the matter of the accumulated arrears of both rental and taxes continued in the south-east of the province to be unsatisfactory, both from the standpoint of the Government and the stockman because of prevailing low market prices for livestock and continued drought over the area. The provincial tax continued to be levied at the rate of 2 cents per acre over the grazing leases of the province.

In 1936 the Government proposed that the matter of the collection of rentals and taxes on grazing leases should be undertaken by one Department of the Government, namely the Department of Lands and Mines and that the payment of such levy should be payable in advance annually, rather than payments on a semi-annual basis as prevailed under the Dominion and has been continued by the province. In the matter of the accumulated arrears of rental and taxes the Department was prepared to spread such arrears over the balance of the term of existing leases, the first payment to fall due, on such instalment of arrears on 1st of January, 1938. The first current payment of rental and taxes, payable in advance was to fall due on January 1st, 1937.

The Western Stock Growers' Association protested the payment of the rentals in advance, and urged the Government to postpone any action in regard to grazing leases either by way of rental or taxes for a period of eight months, and arranged an interview with the Premier in January of 1937 with a view to discussing the matter.

On the 31st of December, 1936, the Department had some 2,823 grazing leases all over the province with arrears of rental plus interest amounting to \$119,662.90. The number at that time showing no arrears and paid to date amounted to 1,663 leases. The number showing balances due of over \$1.00 totalled 1,160 leases.

Investigation of these 1,160 leases, which showed unpaid balances at that time, showed that some 25 lessees owed the sum of over \$97,000.00, leaving approximately \$22,000.00 outstanding against the other 1,135 leases. The majority of the \$97,000.00 was owed by lessees whose ranches were situated in the south-eastern part of the province, viz., the short grass area.

As the outcome of a delegation of the Western Stock Growers' Association which had a meeting with the Premier and the Cabinet in January of 1937, the delegation accepted a compromise of the taxes being reduced to an equal amount of the grazing rental in the respective zones. For example, if the rental was 2 cents per acre the tax would be 2 cents per acre, if the rental was \$2.10 per quarter section per annum, the tax in that zone was reduced from 2 cents to equal the rental of \$2.10

per quarter section, making a total of \$4.20 per quarter section, rental and taxes, in that particular zone.

The payment of the arrears was to be accepted in 7 equal annual instalments, commencing January 1st, 1938 and continuing to 1944, with interest on the undue amounts from January 1st, 1938 to December 31st, 1939 at 4%, it being understood that interest on any overdue instalments should bear interest at 5%. Part of the agreement was that the current payments of rental and taxes should be met promptly in advance in order to keep the consolidation of the arrears in good standing. At the same time the Government made a remission of the interest on the rental to that time and cancelled the accumulated tax penalties in keeping with the procedure under general tax consolidations.

With a view to clearly showing the effect of Order in Council No. 102-37, dated February 2nd, 1937, covering the changes outlined, and its effect upon the individual lease, an example of Ranch No. 16074A is quoted below. This ranch lease consists of 1,121 acres situated in the short grass area and is in the zone where the rate of \$2.10 per quarter section rental, and \$2.10 taxes apply, making a total levy of \$4.20 per quarter section.

Standing of Account—Ranch No. 16074A

Charges:

1937 current rental.....	\$ 14.71
1937 current taxes.....	14.71
Rental arrears, Dec. 31/36.....	150.41
Interest on rental arrears.....	7.32
Tax arrears, Dec. 31/36.....	160.16
Penalties on tax arrears.....	51.71
	<u>\$399.02</u>

Remissions:

Interest on rental arrears.....	7.32
Tax adjustment by Section 2 of Regulations.....	33.56
Accrued penalties by Section 3 of the Regulations (Taxes)	51.71
	<u>92.59</u>

Balance owing\$306.43

Schedule of Payment of Balance Owing

Current rental payable by terms of lease:

Due June 1st, 1937.....	\$ 7.36
Due December 1st, 1937.....	7.35
	<u>\$ 14.71</u>

Current taxes payable by Dec. 15/37..... 14.71

Rental and tax arrears payable in seven annual instalments as set out, with interest in addition at 4% on undue instalments and 5% on overdue instalments:

Due and payable January 1st, 1938.....	\$39.59
“ “ “ “ “ 1939.....	39.57
“ “ “ “ “ 1940.....	39.57
“ “ “ “ “ 1941.....	39.57
“ “ “ “ “ 1942.....	39.57
“ “ “ “ “ 1943.....	39.57
“ “ “ “ “ 1944.....	39.57
	<u>277.01</u>

Total\$306.43

In addition to annual payments on account of arrears, all current rental and taxes, commencing with January 1st, 1938, are payable strictly in advance on January 1st of each year.

It can be seen from the foregoing example that such a consolidation has been of material advantage to the stockman struggling under a load of arrears and taxes accumulated through drought and overgrazing in combination with low market prices. The remissions made, it can also be seen, have been quite considerable to the stockman struggling under such conditions.

It can be seen from the foregoing example that in the case of this ranch the annual rental and taxes amount to \$4.20 per quarter section, or 2.62 cents per acre. The addition of the annual instalment upon this rancher's arrears, which amounts to 3.52 cents per acre, makes a total annual cost per acre of 6.14 cents which this stockman must meet. This was still a heavy burden under prevailing conditions for most of the stockmen.

Therefore, upon representations to the Minister made last fall by individual stockmen, who found that they were unable to continue to meet the current levies and pay the consolidation payments under prevailing circumstances, a further adjustment was made.

Under Order in Council, No. 791-40, it is now possible for a lessee who is unable to carry on under the previous adjustment, to have the term of the payments under the consolidation spread over the balance of the term of the lease. It also makes it possible, at the discretion of the Minister, for the purpose of such consolidation, to renew any existing grazing lease by the issue of a substantial lease granted pursuant to the regulations governing the issue of grazing leases on provincial lands, for such term as he may decide if the lands comprising the lease are found, upon inspection by an official of the Department, to be unsuitable for agricultural purposes.

This adjustment is made provided the consolidated account of the lessee is in good standing, as of 31st December, 1939, and makes it possible to issue a new lease for terms of ten to twenty years with the payments spread over the life of such lease. Such adjustment is making it possible for the present lessees, who have spent a lifetime in the business, to carry on, and keep going concerns in business.

Interest is charged at the present time on overdue current charges, but no interest is levied against undue consolidated arrears. However, where the annual payment on such consolidated arrears becomes due and is not paid within thirty days from the due date, then it is classed in with the current charge and interest at the rate of 5% is levied.

It can be seen that the Minister and the Department of Lands and Mines are endeavouring to meet the fluctuating conditions of the industry, from time to time, in an endeavour to add that stability so necessary for the successful conduct of the business over a long term of years.

The latest adjustment has met with a very favourable response from the stockmen in general as it is permitting them

to plan their operations more satisfactorily over a long term of years with the burden of arrears lightened by smaller annual payments over a longer term.

The Appraiser, however, is of the opinion that some adjustment of the zoned rates will be necessary, taking more fully into consideration the soil, climatic and other factors upon a carrying capacity basis, so that they may become actually more equitable to all concerned than a flat rate per acre basis, which has been shown elsewhere in this Report as not always commensurate with the forage cover and carrying capacity under drought conditions.

The Grazing Regulations of the Province already provide that the number of stock grazed upon a lease can be varied up or down at the discretion of the Minister, depending upon its carrying capacity to meet the varying conditions which may prevail from year to year, so that such adjustment of the zone rates can be made in view of the information now available on prevailing conditions.

The Appraiser, after a study of the regulations in force in other provinces and states, is of the opinion, that with the assurance of twenty year leases, the privilege of such renewal within five years of the expiration of the lease, and a period of ten years in which the grazing rates can be set by the Minister upon a more or less stable basis, the Province of Alberta presents a broad and fair set of regulations under which the stockman can operate with some assurance of tenure over a long period of years.

With a change in the basic method of arriving at the grazing rental rates, upon a basis which takes into consideration the carrying capacity of the lands and the fluctuations of the market price factor of the stockman's product, as proposed by the Short Grass Association and outlined later in this Report, Alberta may well take the lead in the protection and conservation of one of its greatest natural resources, namely, grass.

PART II

Section II

COSTS OF PRODUCTION

In dealing with production costs of cattle and sheep in the short grass area, it is necessary to understand that the findings of this Report are limited to time available and the work of only one individual, so that the results may not be as comprehensive as might be possible under other circumstances. The facts gathered and analyzed, however, will serve as a basis upon which evidence presented can be dealt with and improved conditions started.

For any necessary future adjustments, the data gathered by the Economics Division of the Dominion Department of Agriculture, in course of preparation since the beginning of 1939, will be available when such Report is completed. Through the courtesy of Dominion officials in charge of this survey, the Appraiser has secured the co-operation of the Division.

In dealing with costs of production, it is necessary to deal with the statement, so often made by producers of either livestock or grain, to the effect that it costs so much to turn out a product, that a reasonable profit above cost is, of course, necessary and that the Government should set such a price. In analyzing such a statement, the criticism is that it is putting the cart before the horse in so far as the product is concerned. Livestock and grain are in competition on a world market and if the other fellow is producing it at a lower cost, then if he, the producer, is to survive in the face of such competition, he must cut his own costs in order to be able to compete. He knows about what he will get for his product on the world market and is forced, therefore, to cut his cloth to fit the suit if he is to survive in the face of such competition.

This brings up another point, to the effect that actually very few individual producers, either of grain or livestock, are in a position to tell you their exact cost of production, due to the fact that a proper set of records, from which they or anyone interested can quickly determine their costs, is not kept.

The Appraiser found in this survey that of the sixteen ranches visited only three were found to keep a complete set of books from which almost any factor of production costs could be easily determined. These three are actually the only ones who know what it is costing them to produce their livestock. The others may think that they know, but cannot be sure. They have no way of determining where to look for the leaks which may be sinking their enterprise and may be blaming the wrong factors for their difficulties.

The importance of keeping a good set of records in the stock business cannot be too strongly emphasized, so for that reason, as well as the other important information contained, the following address by one of the most successful stockmen in the State of Wyoming, is quoted in its entirety, from "Cow Country", Official Bulletin, Wyoming Stock Growers' Association, Cheyenne, Wyoming, November 20th, 1939.

We recommend to every reader of "Cow Country" the following address of Mr. E. Warren, Chairman of our Executive Committee, delivered before the Colorado Stock Growers' and Feeders' Convention, Montrose, Colorado, June 23rd, 1939. Here we have the portrayal of actual experiences extending over a period of a great many years of an outfit that has engaged in both the sheep and cattle business. Mr. Warren's story of the experiences of his company is timely; especially does it bring to our attention that we must put our house in order. We are confronted with increased costs brought about by the Taylor Grazing Act, the threat of reduction in numbers of livestock that is grazed upon the forest reserves, steadily mounting taxes, and last but not least, excessive rentals collected in our state and school lands. (Editor.)

My father came to Cheyenne in 1868. He had been raised on a farm in the Berkshire Hills of western Massachusetts, had enlisted in the Civil War in the 49th Massachusetts Volunteers and after the war ended became manager of a stock farm near his birth place. He had very little money and was ambitious, and so when an old neighbor, Mr. Converse, offered him a job as clerk in a store which Converse had opened in Cheyenne in 1867, he jumped at the chance to follow Horace Greeley's advice to go west. At that time Cheyenne was a boom town full of free spenders, whereas my father had been raised in a community of farmers that seldom had any money and took mighty good care of what little they had. So it was fairly easy for him, by sticking to the frugal habits that had been drilled into him as a lad, to save enough in a few years to speculate in livestock, which in the early seventies were just being brought in, and which seemed to promise good profits.

In about 1873, he and Converse bought some sheep which they farmed out on shares. A few years later he had formed a partnership with William B. Miner of Fort Collins, under the name of Miner and Warren, to engage rather extensively in the sheep business, with headquarters at Laporte, Colorado and Cheyenne. At about the same time, 1876, as I recall the date, he also entered into a partnership with William Guiterman of Cheyenne to run cattle purchased from trail herds that were beginning to be driven north from Texas.

We still have the old books of account of the two firms, "Miner and Warren" and "Guiterman and Warren." I find from the former that in those days it cost about 70c per year to pay all expenses per head of sheep. The cattle partnership books show that for the first ten months it required about the same per head to run cattle—69c to be exact—so that the yearly cost was about 85c.

Now I mention this early history, not because I think you are interested in my father's early biography, but to bring out two points which I desire to emphasize.

In the first place, I want to point out the value of keeping records—of bookkeeping as it is termed. These old records were crude and certainly not complicated, yet it is possible

now, after a lapse of over sixty years, to find from them facts about the cost of operating the business, which I fear many present day stockmen do not have with respect to their operations. Looking back over my experience and my father's, covering two generations, I feel that one of the prime essentials of any successful business is to keep a set of records which will keep the owner constantly informed about costs as well as income. Such a set of records can be very simple and there are many good methods of arranging them, but whatever method is used, a properly kept set of books is, in my mind, one of the prime essentials of success.

In the second place, these early records disclose the magnitude of the change that has come about in the methods and cost of ranching in the last half century. In the seventies, grass cost nothing. Oftentimes an outfit running several thousand cattle or many thousands of sheep did not own or lease even as much as a quarter section. They had no build-ings, fences or other improvements, except perhaps a log house and a little horse pasture, and they put up no hay, except a little cut along some creek for winter feed for saddle stock. Practically no investment was required except in the livestock itself. Contrast that with the present day, when frequently several times as much capital is invested in land, improvements and equipment, as in the stock itself, and bear in mind that this investment brings in no direct revenue. The livestock must earn enough income to pay the interest, taxes, depreciation, and upkeep of all these things.

This situation is pretty well expressed in a report of the livestock sub-committee to the natural resources committee of Wyoming, as reprinted in "Cow Country", the publication of the Wyoming Stock Growers' Association, January 13th issue.

I quote:

"No longer is it possible to take up a homestead or buy a small piece of land and with it as base run several hundred or several thousand head of livestock. Every spear of grass must be paid for, either by taxes and interest upon owned land, or by rentals or fees upon private, state, and government land. Where once the stockman's main investment was in his livestock, today his total investment may be from two to five times the value of his livestock alone. Yet practically all his cash income is derived from the sale of livestock or its products, such as wool, which therefore have to pay the immensely increased load of overhead above described. There is no income from grazing land except indirectly through the livestock.

During this same development period the stockman has discovered that in order to meet his immensely increased overhead costs, he must breed more productive livestock, which produce heavier steers of better quality, more and better lambs and wool. But this has involved the increasing use of supplementary feeds, protection of his range by fences and of his stock by barns and sheds. And so as time went on he has found it necessary to employ more labor, and buy increasing amounts of supplies. If prices had remained perfectly stationary during this long period, he still would be faced not only with the rapidly increasing overhead due to the passing of the free range, but also greatly increased need of supplies.

But prices have not been stationary. It is common knowledge that the prices of almost all manufactured products are today considerably above pre-war levels. So that the rancher who in the beginning got along profitably without the hay

mowing machine, the wire fence, buildings, feed stuffs and the like now finds that he must have them, and that they have risen in price.

One other thing has contributed greatly to the rising cost of raising livestock. I have mentioned the increase of taxes due to greater ownership of land. But added to that is an immense increase in the per acre tax cost. Up to about 1905 or thereabouts it was unheard of to assess grazing land at more than \$1.00 per acre; the usual figure was 25c to 75c. But during the dry farming boom, with its attendant high-pressure land salesman, actual sales of raw dry land, grazing land if you please, were made at prices ranging from five to fifty or sixty dollars per acre. As a result assessed valuations were jacked up to such levels that in many cases the taxes per acre collected were considerably in excess of the rental value of grazing land. The tax authorities of course were not greatly to be blamed. After all, if the land were capable of producing the crops claimed by the land salesmen, the cow man had no business running stock on it. It was too valuable. But experience has shown that in most cases such crops—except in rare and unusual years—were an illusion. Hundreds of abandoned farms once plowed up with so much hope and enthusiasm are the sad proofs.

Assessing authorities have, under insistent pressure, reduced valuations part way towards a grazing value, but still not down to a figure justified by years of experience in the use of grazing lands. And as the country has developed and new services have been undertaken by various state and local agencies, especially school districts, the rate of taxation—the levy rate—has almost constantly increased so that the rancher today, as compared to his predecessor, has first, to pay taxes on more acres, second, to pay those taxes upon a higher valuation per acre, and third, to pay a higher levy rate upon each dollar of valuation. It is easy to see how his taxes have been pyramided, particularly upon his ranch holdings.

Now, unfortunately, the ranchers' income has not kept pace with these enormously increasing costs. His livestock and wool are of much superior quality today than in pre-war days, but its sale value per pound has had very little increase, indeed, for a long period during the bottom years of the depression his sale prices were much below pre-war average."

I wonder how many of you practical stockmen have analyzed your situation today and realize how this enormous increase in the overhead expense of your business due to rentals, taxes, interest and depreciation, and upkeep of improvements and machinery—how many realize how this enormous increase in the overhead cost per head of running livestock has eaten into your possible net income? How many of you before buying that extra piece of range have stopped to consider how much it was going to cost you every year in taxes and interest on the purchase price?

In the country where we operate, the last free range was homesteaded in the years 1906 to 1910, and from then until about 1920 the dry land farming boom drove purchase prices of land far above what any rancher could afford to pay for grass land.

Incidentally, this same boom drove assessed value to such heights that at the peak of the boom, taxes were usually higher per acre than the fair gross rental value of the land for grazing. Had it not been for a similar boom in livestock and other prices

the results would have been bankruptcy long ago for many livestock outfits which owned a notable percentage of their range.

I have had hammered into me, by painful experience, a fair idea of the real economic value of grassland. My outfit was compelled to buy or lease more and more of its range until today we are required to own or lease it all. You who were more fortunate in the past will soon face the same situation, though many of you will lease from the Forest, or Taylor Act land which now rents at much lower prices than private or state land. I venture to predict, however, that as time passes, this difference in rental costs will disappear—either by increases in Forest and Taylor Act rentals or by lower private and state rentals and taxes on owned land. In any event, I suggest that you should begin to discover for yourselves what this grassland is really worth—not what it is currently selling for—lest you suddenly find your overhead eating you out of house and home.

I have in mind two studies by disinterested agencies along this line. One by Dr. Vass of the University of Wyoming, who was given access to the actual books of account of many sheep outfits in the Red Desert Area of Wyoming—Bulletin No. 229 of the Wyoming Agricultural Experiment Station, and the other by Marion Clawson of the Bureau of Agricultural Economics, U.S.D.A., based upon actual operating figures in Montana. I think your own Agricultural College has made similar studies, but I have not seen them.

The two bulletins I have mentioned reach strikingly similar conclusions. Vass concludes that the real value of Red Desert land, which he finds requires 18.6 acres per sheep unit per year, is 51.2c and that the maximum gross rental value of enough land for one sheep unit per year is 70c. Clawson concludes, from a study of Montana operating figures, that based upon a twenty-five year period a gross annual rental of land enough for one cattle unit should not exceed 25c per month or \$3.00 per year. For one sheep at the usual ratio of 1 to 5, this would be 60c per year. He further observes, "When compared for a long period, cattle and sheep ranching are able to earn almost exactly as high an income for land if five sheep are considered equal to one animal unit."

Here are two unbiased public agencies, approaching the matter from entirely independent angles, one studying actual Montana figures, the other actual Wyoming figures, arriving at about the same direction. (If these conclusions are right, and I think they are, then the real economic value of grazing land varies from perhaps 30c per acre for poor land up to a maximum of \$1.24 or \$1.50 for land that will carry from 25 to 30 head of cattle per section per year). And if these conclusions are right, the outfit that pays \$3.00 or \$4.00 or \$5.00 for unimproved grazing land in this country in large amounts is licked before it starts. I think you stockmen ought to get out your pencils and figure it out for yourselves, as applied to your own outfit. If you find these conclusions are right you ought to point this out to your assessing officials. All over the west assessed valuations for grazing lands are, in my opinion, much too high in spite of the fact that great reductions have been made since the crest of the land boom.

Now what can we do to meet the present day high costs of running stock?

I think the first thing to do is to get right down to brass tacks and analyze our costs to see if any can be cut. This

requires that a good enough set of books be kept to inform us as to what our exact costs are, and to classify them.

The next thing is to set about raising our income per head of stock by improving the quality of our stock and the quantity and quality of our annual calf or lamb crop. Progressive stockmen are beginning to realize that income does not necessarily depend upon the size of the herd—that by increasing the calf or lamb crop, by producing a higher grade steer or a sheep which produces heavier fleeces—it is possible to increase gross annual income without increasing the breeding herd, and without greatly increasing the cost per head of operating.

When grass was free and quality livestock did not command such a premium over common grades as at present, grass income depended pretty largely upon the number of stock run. Today such is far from the case. Just as dairy farmers have discovered that so-called "boarder cow" contributes nothing towards annual net profits, so the progressive stockman is learning that inferior stock is a dead weight on his business, and that constant culling of breeding stock, coupled with more careful selection of the best sires that can be afforded, will result in greatly increasing our annual gross income without any corresponding increase in annual expense.

They are also learning that it is much more profitable to run less stock and maintain them in better condition by a reasonable amount of supplemental feeding of hay, cake and various other concentrates.

For the past 10 or 15 years we have been hand picking our ewe lambs with the aid of our Wyoming University, to select for breeding stock the heaviest wool producers. As a result our average fleece today weighs fifty per cent more than 10 years ago. Or to put it another way, we shear as much wool from 10 sheep today as we did from 15 about 10 years ago. Not only that, but because we use more supplemental feed, we are getting as many lambs, on the average, each year from those 10 sheep as we got from 15 sheep 10 years ago. Obviously we can maintain 10 sheep in luxury cheaper than would be required to furnish a meager living to 15.

In running cattle we have followed the practice of raising the quality of our cows by constantly culling the least desirable. We believe dry cows should be sold each year because in that way we eliminate barren cows or shy breeders, while cows where dry and fat bring a much higher price on the market than at any other time. We have followed the practice of breeding entirely in pastures and in bunches of not over 250 to the pasture. We watch carefully during the breeding season to see that bulls are distributed evenly to all the cows in each pasture—this is especially necessary if there are several watering places in a pasture—and we change bulls during each season. That is, we put part of the bulls in for 10 days or two weeks, then remove them and put in fresh ones and let the first ones rest, and then exchange again with the first lot.

Cowmen who follow these and similar practices are getting calf crops of ninety or ninety-five per cent as compared to sixty or seventy per cent or even less under old open range methods, and again I remind you that it is good business to run less stock and take better care of them. It is in fact the only way I can suggest to combat present high overhead costs of ranching.

In conclusion, I should like to suggest that we in the livestock business, instead of leaning on the government for aid

in our various troubles, should sharpen our wits and study our business to find how it can be made more efficient. We might as well realize that, under modern fiercely competitive conditions, the Lord will help those who help themselves. This country was made great, not by government spending and subsidies, but by men who fought hard to overcome obstacles, and who used the brains and the courage that God gave them.

This address is of great importance to the stockmen of southern Alberta for a number of reasons. Mr. Warren points out the cost of running cattle in his state under open range conditions from his father's records, representing 70 cents for sheep, per head, per year, and 85 cents for cattle, with the cost of the grass in the seventies costing nothing.

He then deals with land value assessments there up to 1905, showing grazing lands at 25 to 75 cents per acre with a maximum of \$1.00, which skyrocketed after the land boom period, to from \$5.00 to \$50.00 or \$60.00 as a top.

He points out the results of two investigations into costs in Wyoming and Montana, in addition to showing the importance of keeping a good set of ranch records, no matter how simple.

The two investigations which he quotes, that of Dr. Vass of the University of Wyoming, published in Bulletin No. 229 of the Wyoming Agricultural Station, conducted in Wyoming, and that of Marion Clawson, of the Bureau of Agricultural Economics, U.S.D.A., conducted in Montana, reach more or less the same conclusions.

Clawson found that the maximum gross annual rental charge per animal unit of land, sufficient to support such unit, should not exceed \$3.00 per year. The real economic value of grazing land, therefore, varies from 30 cents per acre for poor land up to \$1.24 or \$1.50 for land that will carry 25-30 head per section. Mr. Warren concludes with the observation that outfits paying \$3.00, \$4.00 or \$5.00 per acre for unimproved grazing land in the Western States are handicapped from the start.

The same would be analogous to this country. On the basis of those figures, the real economic value of land, with a carrying capacity of 1 head of cattle to 40 acres, 7 months grazing, would not exceed 75 cents per acre, and the annual net land rental or taxes should not exceed 3 cents per acre per annum for such land.

As a result of his own experience in both cattle and sheep, he also points out some ways by which the individual stockman can cut his costs, namely, by emphasis on quality, rather than quantity. Careful selection of breeding ewes for meat and wool, elimination of "boarder cows", breeding herds of not over 250 head per pasture, change of bulls during the breeding season and riding for distribution of the stock.

This is resulting in a calf crop of 90 to 95 per cent, as compared with 60 to 70 per cent under old range methods. Mr. L. B. Thomson found the calf crop percentage on the ranches

he investigated on the short grass prairies of Alberta and Saskatchewan to average 70 per cent.

The calf crop of 70 per cent mentioned by Mr. Thomson is stated to be higher than the general average estimated for Saskatchewan and Alberta.

The Appraiser has found in his investigation that the calf crop percentage is generally higher on the best ranches in the western United States than in the short grass area, running over 85 per cent with some ranches there and getting, by improved methods, from 95 to 97 per cent calf crop. This has a consequent effect upon costs of production, with small, if any, added expenses. It may be stated, also, that the calf crop percentage anywhere is a matter of conjecture and haphazard guess work unless a system of accurate records is kept by the individual stockman.

A system of ranch records, which is not complicated, and is adapted to the needs of the stockman, has been prepared by Mr. Mont H. Saunderson, of the Intermountain Forest and Range Experiment Station. He has conducted a management and business study of several hundred ranches in the western States and has had an opportunity to observe the kind of records kept by ranchers and to study their needs in this respect. As a result of this work, he recently prepared for western stockmen a system of records and accounts which, in the Appraiser's opinion, are worthy of study and attention by the short grass rancher, as being adaptable to his needs. A sample of these records is attached to this Report as Appendix "L", such being available from the American National Livestock Association, 515 Cooper Building, Denver, Colorado, U.S.A., for the sum of \$2.50 per set (American funds). These could be procured no doubt at still smaller cost if bought from the Association in quantity by one of the Stock Growers' Associations here.

To give the reader an idea of what such records contain, and what every system of ranch records should contain, the following article by Mr. Saunderson in the "American Cattle Producer" is quoted in full because of its importance in the determination of the operator's costs of production.

Mr. Saunderson points out in this article many of the advantages to the operator of keeping a good set of records and shows what they should contain, together with the many questions which they will answer for the operator, if he will but keep them.

It may be pointed out that many ranches here are in the stage of sons taking over from their fathers. Records, on such occasions, simplify matters a great deal.

SYSTEMATIC RECORDS AID IN MANAGEMENT

By Mont H. Saunderson,
Economist, Intermountain Forest
and Range Experiment Station

Any successful stock ranch operator carries in his mind the management plans of his ranch operations. If the ranch

is of any considerable size, the operator cannot, however, carry in his mind or remember for long the details of his operations.

A systematic plan of recording the details of operation of the ranch offers an aid to management by making it easy for the operator to bring together and think about these details out of which his future operating plans are developed. The management of a stock ranch requires a plan of operations, and a day by day control over the details of operation. A simple and workable system of records can be used as a real aid to both of these aspects of management.

The kind of records used by western stock ranch owners and operators now varies from the little vest pocket note-book for recording the livestock counts and making other memoranda to the 'complete' double-entry accounting system that may give the operator but little information other than dollars and cents and is so complex and perfect that it becomes an end in itself. Of these two extremes, the former is preferable. What, then, should a practical plan of records consist of and what kind of information should it afford?

RECORDS SUITED TO THE STOCKMAN'S NEEDS

The purpose of any record form should be to bring together certain essential information in an orderly way. A set of such record forms classifies and organizes information in a system for easy interpretation and use. Each record form should cover some one phase of the ranch operation, and all of the forms together should give the complete picture. The following are the several record forms that make a simple and practical system for the western stock ranch operator:

1. The record of the land set-up and land use: This record form should show the plan of use of the different pastures and ranges, the time they were used, and by how many of different classes of livestock. This form should also have a space for recording land lease and contracts and payments made on them as an aid in control of business detail relating to land. The land record should also provide space for making an outline map of the ranch lands.

2. The livestock record form: This record should show the counts of the different classes of livestock, the sales and sale weights, calves raised, purchases, losses, and the dates of the important management operations.

3. The record of feeds and feeding: This form should provide a record of the quantity of feeds raised and purchased, the general plan of the use of feeds and the approximate amounts used by different classes of livestock, the dates during which different classes of livestock are fed, the rates at which they are fed, and the information on the weights and feeds used by any stock that is fattened for market.

4. The record of equipment: The purpose of this record is to give an accounting of machinery and equipment and of buildings and improvements values and costs for the financial summaries.

5. The record of notes, accounts, and contracts: This form should give a systematic record of financial items showing the amounts and dates for all the items due and payable. The purpose of this record is to aid in control over business detail and to furnish the basis for the financial accounts.

6. The property statement: The accounting term for this record form is the 'balance sheet'. The purpose of this form is to summarize the values of the property owned, the financial

obligations outstanding, and the owner's equity in the business. The five record forms that have been previously described should contain all the information that is needed for preparing this form.

7. Estimated expenses and income for the year: This form should give the financial plan for the coming year, showing the estimated requirements for the different items of operating cost, the probable sales and income, and use of credit.

8. The records of cash outgo and income: These records of cash outgo should provide a number of columns with the names of the principal kinds of expenditures printed at the top of the column. When the expense items are recorded, the dollars and cents figures can then be entered in the appropriate columns, and these columns when totalled take the place of a ledger account and do away with the necessity of posting from a journal to ledger accounts. This same procedure should be followed in the record of cash receipts.

9. The labor pay roll and labor time record: For the ranch that is hiring considerable labor, this form furnishes an easy plan for keeping a record of the time worked by each employee, the amount earned, the value of supplies drawn, and the settlement of the account at the end of the week, the month, or other period. This form may also be used to make a monthly distribution of the days worked to the various kinds of work done on the ranch, such as haying, feeding, working cattle, ranch improvement, etc. This information is for making calculations on costs and for making budget estimates for the next year's operations.

10. Summaries: There should be a form which provides a simple and easy procedure for summarizing the operating records and preparing the financial statement of income and expenses. This form should also provide for the summary of labor time from the pay roll record.

11. A record of weather and range conditions: This form should provide space for writing up memoranda on the important aspects of weather and range conditions through the year, such as will help in interpreting the operating results of the year and comparing them with former years.

THE USE OF THE RECORDS

The manager of any production set-up is continually making a choice between alternatives. The western stock ranch operator has to make decisions of both short-time and long-run objectives, such as: 'Shall I try to develop more hay production, buy hay, or buy concentrates?' 'Shall I market calves, yearlings, or steers?' 'Shall I buy more range or continue to lease?' 'Shall I run my own breeding herd or buy stocker cattle?'

The kind of record system described in this article will be of a great deal of assistance in answering these and other questions of management which an operator must try to figure out.

Records of this kind have proved exceedingly valuable to ranch operators in making credit arrangements. Operators who have been under pressure to secure refinance loans during low-price periods have found it much easier to deal with finance groups when a record of the past years' financial results are placed before them. The financial statements and financial budgets and plans which are provided by a record system of this type will always make it easier to work out

the current use of operating credit with a bank or other production credit institution.

The history of ranch operations and management provided by the systematic plan of records that have been described in this article have in many instances made it much easier for a son or other member of a family to take over and carry on with the successful operation of a ranch.

The Dominion Range Experiment Station some years ago made a survey of the costs of some ranches at that time in the short grass area of Alberta and south-western Saskatchewan. Some of their findings are quoted below, as follows:

ECONOMICS OF BEEF CATTLE PRODUCTION

In addition to the actual experimental work at the Station, ranch organization studies have been conducted since 1927. The object of these studies has been:

1. To obtain a clear picture of the cattle industry so as to have definite information on record for different administrative bodies.

2. To determine those factors which enter into the cost of producing beef and to bring out their financial importance in relation to management practices.

A detailed survey has been made of 27 ranches, representing approximately 50,000 head of cattle, located in southern Alberta and south-western Saskatchewan. The ranches surveyed were regarded as a representative cross-section of the cattle industry. A summary of the results is presented in this report.

RANCH INVESTMENT

When the investment in land and other factors exceeds that of cattle the ranch is in an unstable condition. This fact was quite evident in the survey conducted in 1931. Those ranches that had over 50 per cent of their investment in cattle made a fair rate of return on the investment, up to as high as 7 and 8 per cent being obtained. The average, however, is too low as indicated in Table 7.

TABLE 7—AVERAGE INVESTMENT FOR RANCH RUNNING 500 CATTLE

		%
Land	\$24,942	47.5
Buildings, fences, etc.....	4,637	8.8
Cattle	18,863	36.0
Other livestock	882	1.7
Feed and supplies.....	1,785	3.4
Equipment	1,362	2.6
	<u>\$52,471</u>	<u>100.0</u>

The capital invested in land represents the present valuation of deeded land rather than what was actually paid for it, because if the purchase price had been considered the investment would be much higher. It includes also the purchase of leased land which has a value when a transfer of property is made. The value of deeded land varied from \$5.00 to \$30.00 per acre. Leased land varied from 25 cents to 50 cents per acre, depending upon its carrying capacity and the improvements developed to make the land more productive. The other factors are very conservatively valued. Actually more capital expenditures have been made sometime during the

life of the business, but they have not been included in the above analysis. Economic changes in the cattle business are taking place from time to time in response to changing market demands, and even where it is necessary to change the age of marketing, the investment may have to be increased.

The investment depends on the location of the ranch, the improvements necessary to put it on a workable basis and the climatic conditions, particularly with respect to the severity of the winters. Two examples may be considered. A ranch which is located in the Chinook belt and has natural water supplies, natural barriers for fence and has to feed calves only once in 10 years does not require the same investment as one where watering places have to be constructed, fences built, irrigation projects developed, calves fed every winter and the whole herd fed during some winters.

RANCH INCOME

Rate of return on the investment was used in this study to determine the success of the business in 1931. Each ranch was recorded individually, and then they were segregated according to the age of the animal sold. Table 8 shows the average return on 27 ranches, representing approximately 50,000 head of cattle.

TABLE 8—NUMBER OF CATTLE—500 HEAD

Receipts:		%
Cattle sales	\$5,325	91.28
Other livestock	97	1.66
Crop sales	19	0.33
Miscellaneous sales	16	0.27
Increase in inventory.....	377	6.46
	<hr/> \$5,834	<hr/> 100.00
Expenses:		
Current expenses	\$3,251	64.17
Cattle purchases	1,511	29.83
Depreciation, buildings, fences.....	186	3.67
Depreciation, equipment	118	2.33
	<hr/> \$5,066	<hr/> 100.00
Total receipts	\$5,834	
Total expenses	5,066	
Ranch income	\$ 768	
Unpaid labour	334	
Ranch return on investment.....	<hr/> \$ 434	

Ranch investment—\$52,471.

Rate of return on investment—0.83%.

With a rate of return on the investment of 0.83 per cent it is apparent that stockmen barely met their operating costs in 1931. Of the ranches studied, 10 failed to meet their operating costs and used either reserve capital or borrowed money for operating. The rate of return varied from nothing to 7 per cent.

The current expenses include expenditures for labour, rental and taxes, purchase of feed supplies and ranch expenses. Interest on borrowed capital has not been included.

Since 1931 receipts have been lower due to the depressed market prices. Current expenses have remained the same, and stockmen have had great difficulty in meeting costs of operation.

In studying the current expenses there are a few items that lend themselves to reduction. Wages for labour amounted to 27.8 per cent of the current expenses and could not be reduced as in 1931 they were as low as it was possible to get them. Rental and taxes on grazing land are the most important items that lend themselves to reduction. They amounted to 23.2 per cent of the current expenses in 1931. Since that time some reductions in rentals have been made by the different administrative agencies, but these have been offset by the reduced market prices.

COST OF PRODUCTION

The current expenses per animal unit were \$6.50, without considering depreciation, interest charges and purchase of bulls. When these were considered the cost was \$10.13 per head. Investment charges at 6 per cent amounted to \$6.30 per animal unit. This gives a total cost of expense of all kinds of \$16.43 per head.

In considering the cost per pound of marketable cattle from the ranch unit, Table 9 shows the comparative cost of different ages.

TABLE 9—COST PER POUND OF BEEF

	Average market weight less 3% shrink	Total cost per head	Cost per pound
Calf	400	\$28.13	\$7.03
Yearling	710	49.58	6.98
Two-year-old	1,000	64.16	6.42
Three-year-old	1,275	78.44	6.15

In order for the stockmen in this study to receive a return of 6 per cent on their investments and meet all obligations it would be necessary for them to receive the above price for beef.

The figures in Table 9 are not presented as an indication of the age at which cattle should be sold because many other factors influence this policy. Carrying capacity influences the age of marketing to a marked degree and has been discussed in a previous section of this report. The per cent calf crop influences greatly the cost of production. In this study it averaged 70 per cent, which is much higher than the estimated average for Saskatchewan and Alberta.*

In this study by the Experiment Station it will be seen that the deeded land was a valuation as at that time, rather than the purchase price, which would have made it much higher. As valued, the deeded land varied from \$5.00 to \$30.00 per acre. Why should this be? In most cases the rancher was forced to purchase homesteaders outright, either due to the land controlling water, to consolidate their holdings into more economic units or to make more balanced units. This has been largely as a result of past errors in land policy, and the checker board pattern which has been its aftermath.

*Dominion Range Experiment Station, Manyberries, Alberta. Results of Experiments—1827-1936, inclusive. L. B. Thomson, B.Sc., Superintendent.

The investment of capital in land represented in the above study is 47.5 per cent of the total investment. The cattle investment worked out at 36 per cent of the total. Almost half of the ranchers' capital, therefore, was tied up in land which, in most cases, was purchased at land boom prices far removed from economic land values.

It should be noted that on an average investment of \$52,471 the rate of return on the investment was 0.83 per cent, which is very small when the hazards of the industry are considered. It was found also that 10 ranches failed to meet their operating costs, and either used reserve capital or borrowed money to meet same.

It was then found, in fairness to capable labour and commensurate with it that labour costs, which amounted to 27.8% of the current expenses, could not be reduced very much as they were at a very low level—about as low as possible.

Rental and taxes amounted to 23.2 per cent of the current expenses in 1931, with some adjustment having been made by the authorities in the two provinces. It must be pointed out, however, that since then there was a period of very low prices, which more than offset any such reduction. Such a fall in market prices occurred, that many operators could only see the possibility of grazing more cattle to offset such loss, in order to gross sufficient to meet their fixed costs which remained practically the same.

Table No. 9, under costs of production, shows that current expenses were \$6.50 per head, without considering depreciation, interest charges or costs of bulls by purchase. This being considered it brought the cost to \$10.13 per head. Investment costs at 6% added \$6.30 per unit bringing the total cost of expense of all kinds to \$16.43 per head.

Table No. 9 also shows that for the stockmen included in that study to receive a return of 6 per cent on their investment, that they would have to receive a price per pound of 7.03 cents for calves and 6.98 for yearlings, 6.43 for two-year-olds and 6.15 for three-year-olds.

The Appraiser is aware that these figures have been criticized on the grounds that though market prices fell away below these figures, the majority of these ranches were still in business.

Such may be the case, but investigation will show that many outfits have ceased to operate since that study. Others have had to curtail their operations by selling part of their lands and outfits, while others again have had to borrow either from their reserve, if any, or from outside capital in order to stay in business. It must be pointed out, that still others have had to neglect necessary repairs to fences, buildings and equipment, or let their rental and taxes get into arrears, in order to keep going. It is necessary to say that in such a study the different items must be charged whether they have actually been paid or not, such as rentals and taxes which may actually be in arrears.

Depreciation on fences, buildings and equipment, and the unexpired portion of the leases, too, has to be figured in such

a study, whether or not the rancher actually is able to set aside any reserve for such but, nevertheless, in comparison with any other type of business, this must be calculated.

To that man who has kept accurate records these costs have been easily established, but the man without such records has struggled along rather hopelessly. By raising grain, such operations have possibly carried the differential in the loss actually sustained in his cattle industry, though he may not actually know where it has been made up. A good set of records can obviate this.

The investment charges have been calculated at the interest rate of 6 per cent, which is not unreasonable as that is below the interest rate chargeable on borrowed capital. If the fact is taken into consideration, however, that the rancher has been able to provide a living for himself and family out of the operations, whether shown in a charge for management or not, possibly a return of 3 per cent upon such capital investment in a long time operation, such as ranching, would be perhaps more fair from the actual standpoint of the enterprise.

The individual enterprise also may have been able to produce cattle at a lower figure than shown by superior management, or through improvement in the methods of operation. Many such improvements which Mr. Thomson suggested at that time as being possible to cut costs are reiterated in this Report as being in successful operation in the Western States along with other improvements which have taken place there since that time.

As a matter of comparison the results of a similar survey made in Montana by careful investigators may cause a surprise to operators here. It bears out the above study and is quoted as follows:

COSTS AND RELATED OPERATING FACTORS

Annual Operating Cost per Head: Costs in terms of dollars serve the purpose of a general index in studying differences in operating efficiency of individual ranches. Because of yearly variations in price and operating conditions, costs vary so much that care is needed in applying past experience to an analysis of present data on operating costs. During the period of this study the general price level has been quite unstable. Production cost varies from one ranch to another and on the same ranch from year to year because of weather differences.

Animal Unit: From 1929 to 1933 the average annual operating cost per animal unit—the range cow weighing about 1,000 pounds taken as the unit, yearlings equal to two-thirds of a unit, two-year-olds .85 of a unit, three-year-old steers one unit, bulls 1.3 units. These represent the approximate relationships of different classes of cattle in their annual range and feed requirements—for the ranches studied declined from approximately \$17.30 to \$13.00, or by about one-fourth. Because of relatively good cattle prices in 1929 to 1930, operating costs rose from 1929 to 1931, reflecting the trend of expansion and the competition for labor and range. The rate of wages paid to year around ranch help was about \$40.00 a month in 1929, rising to \$45.00 and \$50.00 by 1931. Following 1931 the low beef prices forced a sharp reduction in costs rates and some reduction in the amount of hired labor, supplies, and

purchased feeds (mostly grain and cottonseed cake). Some such changes appeared to go further than was desirable in securing the most economic returns.

The average annual operating cost for the 5-year period was about \$17.00 per animal unit. This includes the operator's labor at the current wage scale. It does not include any return for management or any interest return on the owner's equity in the investment. The cost for all of the ranches at the start and close of the 5-year period was:

	1929		1933	
	Amount	Per cent of total	Amount	Per cent of total
Labour	\$ 5.90	34	\$ 4.20	33
Supplies for hired labour.....	1.95	11	1.60	12
Feed purchased	1.75	10	1.55	12
Leases	1.75	10	1.20	9
Taxes (real estate and personal)	2.15	13	2.00	16
Depreciation on improvements and equipment.....	1.10	7	1.20	9
General ranch expense.....	2.70	15	1.20	9
Total	\$17.30	100	\$12.95	100

These investigators found the average annual investment, or operating cost per animal unit, to be \$17.00 per head approximately, only figuring the operators' labour at current wage scale with no interest return or management charge compared to Dominion Range Station figures of \$16.43 per head, total expense of all kinds.

This shows that labor and taxes were the two costs items having the greatest resistance to downward change.

A reasonable investment per cattle unit in land would be nearer \$40.00 when one-third to one-half of the range land is leased, or \$60.00 if all land used is owned. Over a long period the investment value per unit for Montana range cattle is between \$40.00 and \$45.00. In the situation most nearly typical of the ranches studied, where part of the land is leased, the total capital investment per cattle unit should not exceed \$100.00. The annual average operating cost per cattle unit, not including the interest return to this investment, should not exceed \$15.00 (including current wage scale for the operator).

Labor Costs: Because of differences in organization and operating methods of the ranches, there was a rather large variation between individual ranches in the amount of labor used per unit of livestock.

Many of the small ranches with 100 to 200 head of livestock found it difficult to work out an economic combination of operator and hired labor.

The average number of cattle handled per man in the plains area is low because of the large percentage of small ranches. Three very large ranches in the foothill region were handling 250 head of livestock (steers) per man per year. These records are not included in the summaries.

Rental: Rental rates on leased range land declined but little from 1929 to 1933. If all the range land used and owned had cost no more than the leased range, including the forest grazing fee, then the annual cost of the pasture per animal

unit would have been about \$2.85 for the mountain valley ranches, \$3.25 for the foothill ranches, and \$2.85 for the plains ranches. The cost of actual leases and taxes paid on range land, plus 5 per cent interest return on the reasonable value of owned range was \$4.00 to \$5.00 an animal unit as an average for all of the ranches during the 5-year period. This shows a considerable difference in cost between the leased and the owned range. The indications are that under competitive conditions the range stockman will pay in one form or another 30 to 35 cents an animal month for grazing, as an average over several years. If grazing cost on leased public lands is much below this point, nearby hay and range land owned by the operator will become more valuable and this added value may eventually appear as a land cost.

Bull Service Costs: No significant correlation can be found between the number of cows per bull and the calf crop.

FACTORS AFFECTING INCOME

Average gross income per animal unit for the three different groups of ranches varied between \$29.48 for the foothill group in 1929 and \$8.73 for the plains group in 1931. (See table 1.) This extreme variation in the averages was caused by declining prices, and a severe drought in 1931 which affected most of the plains ranches. The more important factors determining the income of the ranches were:

1. Calf crop.
2. Weight, quality and breeds of animals marketed.
3. Death losses.
4. Class of animals marketed and their prices in relation to production costs.
5. Size of ranch in relation to efficient organization and family needs.
6. Supplemental enterprises.

Calf Crops: The ratio of calves raised to weaning age to the number of cows in the breeding herd for the ranches was as follows:

	Average Calf Crop %	Highest Calf Crop %	Lowest Calf Crop %
Mountain valley ranches.....	69	90	47
Foothill ranches.....	77	95	52
Plains ranches.....	70	92	40

CATTLE RANCHING IN MONTANA
TABLE 4—GRAZING COSTS ON INDIVIDUAL RANCHES

Ranch Case No.	Number of cattle units	Acres of controlled range ex- clusive of forest or open range	Acres of leased range	Cost per acre of leased range	Per acre value placed by operator on owned range land	Annual cost per acre in taxes and interest (6%)	Cost of grazing per- mit on forest or grazing district		Total annual grazing cost per head	Average number of days on grass	Grazing cost per-day per head
							No.	Cost per head			
1a	745	2,100	1,000	90	10.00	80	100	.76	Dollars	245	1.0
2a	1,310	4,000	2,000	75	8.00	60	800	.65	2.50	215	1.1
3b	730	9,670	8,180	24	5.00	37	650	.69	2.45	315	1.3
4b	650	8,200	4,000	25	5.00	37	500	.88	4.05	295	1.6
5c	1,090	25,140	640	10	2.50	20	620	1.10	4.60	310	1.7
6c	370	7,000	4,500	8	2.00	16	300	1.25	5.10	290	1.1
									3.15		1.1

a Mountain valley.

b Foothill.

c Plains

CALF CROP PERCENTAGE

The calf crop was a very significant factor in the income of most of the ranches studied. None of the ranches except the few engaged largely in the running of steers, a part of which were purchased, was able to show a profit if the calf crop fell below 60 per cent. The individual ranches falling within the range of 60 per cent to 85 per cent calf crop did not show any higher operating costs at 85 per cent or higher than did those obtaining the lower percentages. In other words, the higher percentage of the calf crop and resulting higher incomes were secured by superior management rather than by higher costs.

ECONOMIC RANCH UNIT

Size of Ranch in relation to Income: The ranch which runs less than 100 head of cattle through the year will find it difficult to make efficient use of labor and equipment. A herd of 125 to 150 head, not including calves born during the year, appears to be desirable for the family ranch which uses little or no hired labor, when there is no other income-producing enterprise. A herd of this size will produce on an average, a net family cash income of \$1,000 to \$1,500 unless too large a percent of the investment is borrowed money. The ranches running from 400 to 500 head of cattle appeared to reach optimum results by working out systematic management for use and care of range land, separation of stock at breeding time, classification of stock for winter feeding, and use of separate pastures for heifers calving for the first time. Beyond this optimum size, economic efficiency did not depend upon the size of the ranch, but upon the managerial ability of the person supervising operations. The very large ranches were producing less beef for the resources used, than were the medium-sized and small ranches but some of them were able to offset this by superior business and financial management.

The following ranch was chosen from those studied as being the most comparable to those in the short grass area of Alberta to show set-up, costs and methods, worthy of consideration by ranchers here.

Appendix—OPERATING DATA ON INDIVIDUAL RANCHES

—Ranch No. 3

The location of this ranch is in the south-eastern part of the state, where topography and soils have prevented much farming development. The general elevation is 2,800 feet. Average annual precipitation for the local area is around 12 inches and the acreage requirements for livestock are rather high. During the 1929-1933 period the number of cattle run on this ranch varied between 350 and 450 head.

The land resources consist of four sections of range land and 200 acres of crop land owned, six sections of range land leased, and a permit on a nearby grazing district for 350 head of cattle for an 8-month season, usually April to October 15. The cost of the permit is about \$1.40 per head of cattle for the season. Eighty-five acres of the crop land are irrigated by a power pump from a stream which generally runs until about August 1. The balance of the crop land is used for small-grain hay, generally oats. The alfalfa yields around two tons to the acre. The second cutting is sometimes threshed for seed.

The owned and leased range outside of the grazing district is used for winter and early spring range. Barn or shed shelter is provided only for the thin cows and heifers that need extra feed. The stock water on the range consists of earth reservoirs.

The marketings are principally yearlings, calves, and dry cows. These are generally shipped to Chicago, although the feeder calves are sometimes sold to local buyers. The weight of these calves is usually about 400 pounds and the yearlings 600 pounds to 700 pounds. The operator feeds considerable grain through the winter and spring to increase the weight of his yearlings.

The usual winter feeding period, starting about the first of January, is 80 to 100 days. The oldest and poorest cows and thin calves are put in a separate group for winter feeding. The hay is fed in small bunches on the ground with feeding grounds changed frequently. The poorest hay is fed first. All of the cattle are fed cotton-seed cake in addition to the hay. The animals one year old or more are fed nut sized cottonseed cake in small piles on the ground at the rate of one or two pounds a day per head. The calves are fed pea sized cottonseed cake in troughs at the rate of from one-half to three-quarters of a pound to the head. About 40 days before calving the 2-year-old heifers that show with calf are separated from the herd and given extra feed of hay and cottonseed cake or grain until there is sufficient grass to maintain them. The cattle, excepting the hospital group, are fed hay at the rate of five to 10 pounds per head daily depending upon the quality of the hay and the amount of grass.

During the period when calves are dropped the heifers are kept in a separate pasture and looked over twice daily. If the grass is sufficient the heifers are put out on pasture a couple of days after the calf is dropped. During the breeding season the range is ridden twice a week, and the cows are kept 'bunched up' as much as possible. The only conditioning which the bulls receive is good pasture in the spring and early summer.

The practice on this ranch represents an early attempt to get low cost and good quality feeder calf and yearling production in an area formerly thought of as 'big steer' country, but which now requires conservation and careful management of the range and use of considerable amounts of winter feed.

The operating data on this ranch were as follows:

1.—Livestock Numbers (in the fall after marketing)

	1929	1930	1931	1932	1933
Cows and heifers	194	152	173	165	246
Calves	107	92	91	87	148
Yearlings heifers	26	44	10	43	30
Yearling steers	24	46	32	30	15
3-year-old steers	68	67	35	40	—
Bulls	5	5	8	8	8
Total cattle	424	406	349	373	447
Horses	45	56	41	35	30

2.—Production Data

	1929	1930	1931	1932	1933
Per cent calf crop	68	78	80	85	82
Per cent death loss	1½	1	4	2	3
Number cows per bull ..	30	39	40	22	31
Average hay fed per head, lbs.	1050	845	1110	1560	920
Grain and cottonseed cake per head, lbs.	250	110	60	125	56
Calf weights, lbs.	376	420	380	388	394
Yearling weights, lbs.....	686	625	610	730	685

3.—Costs and Income

	1929 Dollars	1930 Dollars	1931 Dollars	1932 Dollars	1933 Dollars
Labor (including wages of operator	1196	1289	927	965	1160
Supplies	362	381	288	318	422
Feed purchased	235	496	353	955	456
Taxes	498	503	411	365	278
Leases	462	462	697	697	521
General ranch expense ..	562	455	266	417	620
Depreciation on equipment	275	289	259	250	238
Total Cost	3590	3875	3201	3967	3695
Gross income	6851	6759	2399	3062	4863
Interest paid	796	796	854	780	755*

SUMMARY

A summary of the findings of these investigators, which, in the Appraiser's opinion, the short grass stockman can well afford to study as applicable to his own case, is as follows:

1. The average annual cost per animal unit was approximately \$17.00.

2. A reasonable investment per animal unit would be \$40.00 in land where half of the land is leased, or \$60.00, if all the land is owned.

3. Where a part of the land is leased this should not exceed \$100.00 per animal unit.

4. The average annual operating cost per cattle unit should not exceed, including current wage scale for the operator but not including interest return to this investment, the sum of \$15.00.

5. The annual cost of pasture for animal unit on plains ranches would work out at \$2.85, with the actual cost leases and taxes paid on range land, and 5% interest on reasonable

*"Cattle Ranching in Montana," an analysis of operating methods, costs, and returns in western, central and eastern areas of the State: M. H. Saunderson, Department of Agricultural Economics, and D. W. Chittenden, Department of Animal Husbandry.

valuation of range land, as an average for the 5 year period of \$4.00 to \$5.00.

6. Expenditures per animal month in one form or other cost the range man over an average of several years, 30 to 35 cents per month.

7. The most important factors affecting the income were:

- (a) Calf crop.
- (b) Weight, quality and breeds of animals marketed.
- (c) Death losses.
- (d) Class of animals marketed and their prices in relation to production costs.
- (e) Size of ranch in relation to efficient organization and family needs.
- (f) Supplemental enterprises.

8. That it cost no more to produce an 85% calf crop than one of 60% or lower.

9. That the economic ranch unit appeared to be the one running 400 to 500 head of cattle, giving optimum results beyond that size, the success being dependent upon the managerial ability of the operator and not upon the size of the ranch.

10. Grazing cost per day averaged 1.3 cents per head.

11. Ranch No. 3. Permit in co-operative grazing district at 1.40 per head 8 months season. Feeds, 80 to 100 days; Cottonseed cake to yearlings; Cottonseed cake, fed to two year old heifers in calf, 40 days before calving and extra hay; calving pastures, ridden twice daily during calving; breeding season, ridden twice weekly and cows kept bunched; methods—an attempt to get low cost and quality production in an area where conservation and careful management is required.

It is suggested that the short grass rancher here in Alberta should take pencil and paper and work out the costs of his own individual enterprise in comparison with these findings in an endeavor to find out how he stands, and to see if by new methods he cannot cut his costs by some improvements. It is to be pointed out that this is what the operator of Ranch No. 3, quoted above, is doing in an effort to secure cost reduction. The short grass stockman in Alberta is in competition with him on the Chicago market, and has the handicap of duty differential to overcome. It would obviously seem to be more important for the short grass stockman in Alberta to endeavour to effect these economies than even for the Montana stockman, who as far back as 1933 was striving to improve his methods and reduce costs.

Such factors are worthy at any rate of consideration, and being given at least a fair trial after careful consideration. The stockman, like every business man, is facing keener competition as a result of improved methods.

OVERGRAZING

The short grass stockman, despite the work of the Dominion Range Experiment Station, does not fully realize, perhaps,

just what overgrazing has and is costing him. The results of the following experiment, secured by the Appraiser while in Montana last fall, will emphasize this more clearly and add further weight to the findings of the Dominion Station, as the experiments were conducted at Miles City, Montana, under conditions similar to those prevailing in the short grass area of Alberta. This will show that by such methods the feed costs of producing calves are boosted about one-third.

OVERGRAZING INCREASES PRODUCTIVE COSTS BY REDUCING NUMBER AND WEIGHT OF RANGE CALVES

By Leon C. Hurtt, Senior Range Examiner.

Overgrazing increases feed costs of producing range calves by more than one-third when compared to productive costs on adjacent range grazed more conservatively. This is the result from a range experiment at Miles City, Montana, conducted over a 5-year period by this station in co-operation with the Montana Agricultural Experiment Station and the Bureau of Animal Industry. This experiment was started in 1933 on typical shortgrass range pastures on which blue grama, bluestem wheatgrass, niggerwool and buffalo grass predominated. The object was to find the best range utilization and management practices for such ranges. The experimental area was subdivided into three portions each grazed at a different degree or intensity of use—overgrazed 23.1, moderately grazed 30.5, and lightly grazed 38.8 acres per head, respectively, by three groups of 20 breeding cows and their calves. High grade Hereford cows of uniform age and breeding were selected for this test and grazed on the three adjacent sets of native range pastures. More supplemental feed in the form of hay was required for cows on the small pastures, otherwise the breeding, care, and other factors were the same for all lots.

Mainly as a result of the extreme drought during the 1934 and 1936 seasons, the density of vegetation on representative quadrates in all pastures had by early 1937 declined uniformly to approximately 10 per cent of the 1933 density level. As a result of quite favourable weather during two successive growing seasons of 1938 and 1939, there has been a substantial increase from this low point, but the total density is still somewhat below the pre-drought level of 1933. Fortunately, there has been an unusual height growth of the drought-thinned grasses during the past two favorable seasons which has partially compensated in volume production for reduced density.

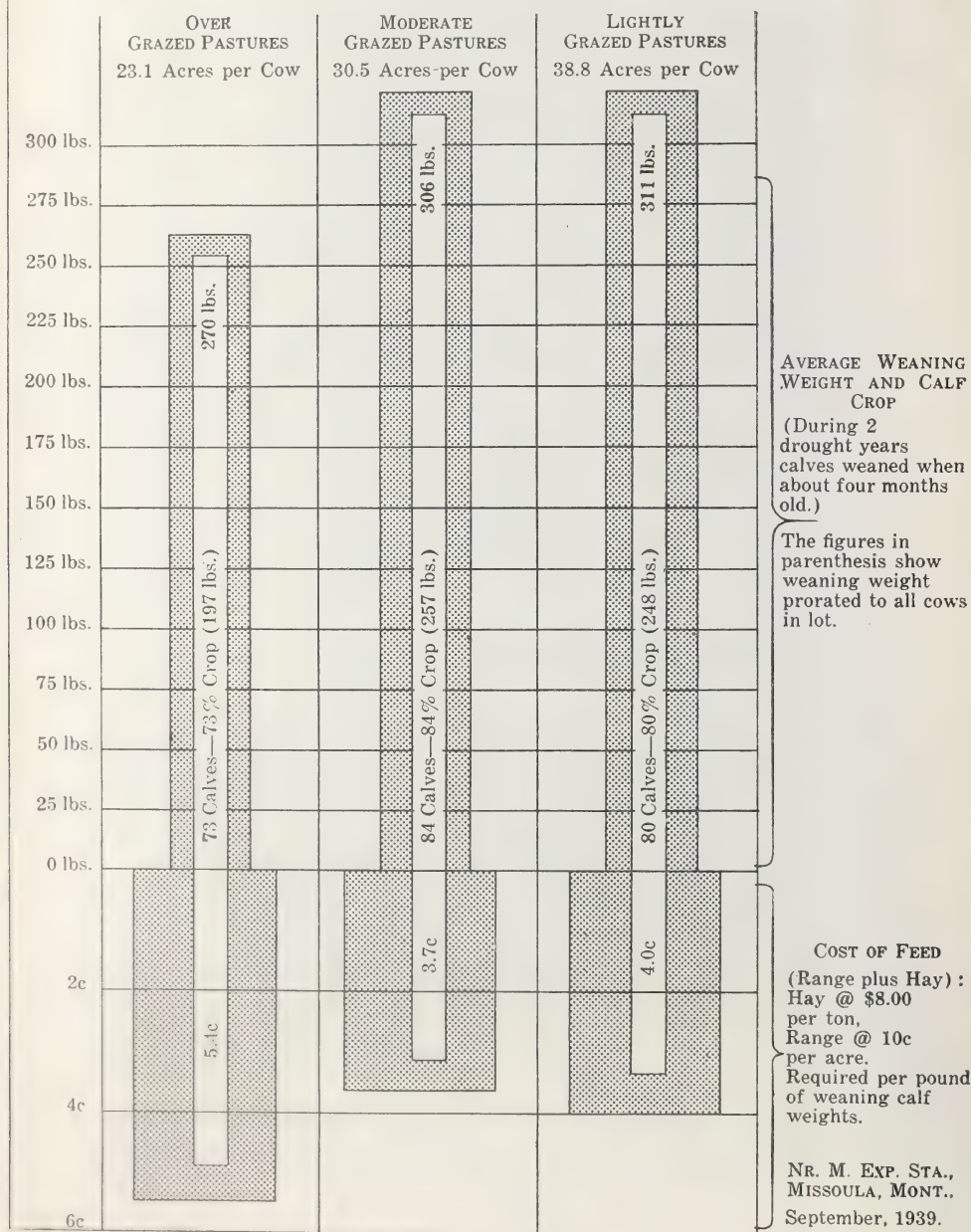
The decline and subsequent increase in density of range forage was not, during the first five years, significantly different under the three intensities of grazing. This is readily explained by the fact that extreme drought in 1934 and 1936 completely overshadowed the effects of different degrees of use during the first stage of the experiment. The experiment will continue to follow trends of vegetation and response of cattle to intensity of grazing for several years.

Despite the uniform trends of forage density under these three intensities of grazing, the penalty exacted by overgrazing has been consistently evident from the beginning in the form of lower calf crops and lighter weaning calves on overgrazed as compared to more conservatively grazed ranges. During the 5-year period of this experiment, the 20 cows in each lot produced 73, 84, and 80 weaning calves that weighed 19,710, 25,704, and 24,880 pounds on overgrazed, moderately grazed, and lightly grazed range respectively. When prorated to all of the 20 cows

WEANING WEIGHTS AND FEED COSTS

Average Weight Calves—5 Year Period

INTENSITY OF RANGE USE



of each lot, this amounts to more than 50 pounds of additional calf weight annually for each cow on the moderately and lightly grazed pastures over and above weights on the overgrazed pastures. The average calf crop, weaning weight, and the average production per cow (including dry cows), as well as the average feed cost per pound of weaning calf weight produced by each lot, are compared on the attached chart.

Attention is directed to the comparative feed costs shown by the bottom section of this chart. Because the cows on overgrazed ranges had to be fed greater amounts of hay, the cost of feed for each pound of weaning calf weight was increased to 5.4 cents per pound or more than one-third above that on either the moderately or lightly grazed lots. This is not all. The lighter calves from the overgrazed lot had a lower market value per pound. Furthermore, the cows of this lot were also thinner and sold for less when replacements were necessary. Thus the range operator who by heavy grazing reduces his calf production by 50 pounds or more per breeding cow, and at the same time is forced to feed more expensive hay to supplement cheap but inadequate range forage, places himself under nearly a hopeless handicap of increased feed costs and greater risks that tend to prevent profitable production.

Even though the density of vegetation on these ranges was reduced uniformly by the drought, the economic fallacy of overgrazing is clearly seen from the calf production data. It is anticipated that the penalty of overgrazing will be accentuated as the effects of overgrazing become significant, as is almost inevitable over a longer period of years. Such overuse usually results in accelerated run-off and erosion as well as cumulative range deterioration. Such a range practice thus leads into a vicious circle of higher costs and reduced returns.

UNITED STATES FOREST SERVICE,
UNITED STATES DEPARTMENT OF AGRICULTURE.

The graphic chart on the previous page clearly depicts these facts, and is worth every stockman's careful study, as the loss is 50 lbs. or more per breeding cow, while more expensive hay had to be fed, boosting the cost from 3.7 and 4 cents per pound of weaning calf weight, to 5.4 cents.

Drought only reduced the forage cover 10%, and this was uniform over the three fields used, so that loss in weight cannot always be fully explained by drought conditions, which simply accelerates the depletion and cost if overgrazing is practised and is not checked, and the results are more evident under extreme drought conditions.

LAND

In dealing with costs, the question of taxes and valuation of deeded land has to be dealt with. Investigation shows that the assessment of grazing lands is generally higher in proportion than lands of more economic value such as hay lands, being consistently over-valued. Some findings from the Western States, such as the following, are enlightening.

Two-thirds to three-fourths of the year-round operation for western range cattle is on deeded land, and one-fourth to one-third is on public lands. A comparison of the cattle numbers and months of grazing in the forests and months of grazing in

the forests and grazing districts with the census of beef cattle number for Idaho, Nevada, Utah, and western Wyoming shows that as an average for the intermountain region 30 per cent of the feed is from the public lands and 70 per cent from the deeded lands.

This general picture shows that nearly all cattle ranches have a heavy investment in hay and pasture lands and range lands, and indicates that many of the ranches are operating entirely on deeded land.

In study of the land use and land costs of cattle ranches in the intermountain region, the Intermountain Forest and Range Experiment Station obtained during 1938 a group of records from cattle ranches located in northeastern Utah, southwestern Wyoming, and southeastern Idaho. The purpose of this article is to compare, for the ranches of this group that operate entirely on deeded land, the land investments and land costs with the standards that have been developed by western ranch management studies.

LAND INVESTMENT AND COST PER HEAD

Western cattle ranch management studies show that the maximum "safe" investment in deeded land is around \$60.00 per head for the year-long operation, and that the annual land cost for leases and grazing fees, land taxes, and the interest return on the land investment should not exceed \$4.00 a head for the year-long operation. These economic studies of western cow ranches also show that as a long run tendency the land taxes will absorb about one-third of the annual land charge, which would mean an annual land tax cost per head of approximately \$1.35 if the annual land charge is \$4.00.

The information in Table 3 shows that the range land is consistently overvalued and overtaxed and that the meadow and pasture land is generally reasonably valued and taxed. In an adjustment of values and taxes on these ranches, the range land should receive first attention and effort.

SUMMARY

The importance of the use of deeded land in the production of range cattle in the Intermountain region makes it essential that this land be properly valued and properly taxed in order to have a reasonable operating cost.

The studies which have been made of western cattle ranch operations and costs make it possible to set up some good general standards of land investment, land values, and land taxes. These general standards can be used as the basis for analysis of the individual ranch situation. There will, of course, be differences in some individual ranch situations that will admit a considerable departure, both above and below these general standards.

The Standards and the individual ranch data presented in this article are based upon year-long operation on deeded land. Where low-cost grazing on public land is used for a part of the year, this low cost for the use of the public land will change the situation of values and taxes on the deeded lands. A study of the records of cattle ranches using public lands indicates, however, that the deeded lands are capitalized and taxed so that total annual land charge is still excessive.

This comparison of land charges of these six individual ranches that operate entirely on deeded lands with the infor-

mation on standards for such operation indicates that it is the range lands, rather than the hay and pasture lands, that need adjustment in the land charge.*

They have found from their ranch management studies that the maximum, safe investment in deeded land is around \$60.00 per head for the year-long operation. Also, that the annual land cost for leases and grazing fees, land taxes and interest return on the land investment should not exceed \$4.00 per head for year-long operation. The long run tendency would be annual land tax cost of about \$1.35 per head if the annual land tax charge is around \$4.00. This set of findings closely approximates those which were quoted in the address of Mr. E. Warren, Wyoming Stock Growers Association, in the section under "Records," and represents suitable standards for a basis of values here.

RANCH DEFINED

If we are to study ranch costs it is necessary that the word "Ranch" should be defined.

The term comes originally from the Spanish word "Rancho" which referred to the enterprise as a whole. The land itself comprised the enterprise, or the buildings and corrals, etc. However, in the English, the term "ranch" has come to refer more to the first two, than the latter, as the ranch buildings, corrals, etc., have come to be referred to as either the "headquarters," or different "camps."

The operator of the enterprise became known as the "rancher," and referred to his "ranch," as the whole enterprise, with his land segregated as to its ownership, whether titled or freehold, and the land owned by the Government or other individuals, which he leased as his "lease."

RANCH DEFINED†

It is in the broader sense that the term ranch is used in this study. It may thus be defined as that unit of lands and equipments devoted to the production of livestock primarily by grazing and which occupies the major portion of the time of one or more men.

LAND

Professor Ely (Richard T. Ely, Professor of Economics of Wisconsin, Madison, Wisconsin; lectures on Land Economics), who has undoubtedly given more thought to the economic concept of land than any other authority, says: "Land means nature as one of the two original factors in production, the other being labour, while capital, the third factor in the category . . . is a derived factor resulting from the action of labour upon nature." This authority points out the fact that land has certain characteristics not common to other goods. He enumerates thirteen of these, the first six of which will serve our present purpose. These are as follows:

*"Land Costs and Investment Standards," by Mont H. Saunderson, Economist at the Intermountain Forest and Range Experiment Station, Forest Service, Ogden, Utah—"American Cattle Producer," December, 1939.

†Bulletin No. 297, "An Economic Study of a Typical Ranching Area on the Edwards Plateau of Texas," Texas Agricultural Experiment Station, B. Youngblood, Director, College Station, Brazos County, Texas.

1. Land is something ready-made;
2. It is peculiarly limited in quantity so far as the available supply is concerned;
3. It has graduations in fertility and situation, these graduations being such in degree to make them a peculiarity of land;
4. The peculiar relation of land supply to . . . population;
5. The immobility of land;
6. The relative and even the absolute permanency of land.

RANCH LANDS

Ranch lands may be formally defined, therefore, as all those lands which are utilized to best economic advantage when devoted primarily to grazing rather than to cultivated crop production. This does not mean that some land may not be cultivated. In fact, frequently there is some cultivated land, but as long as the land in cultivation is used as an adjunct of the ranch business, it may be considered as ranch land. The chief purpose of such cultivated land is to furnish an emergency feed supply for sick and weak animals, or for work-stock.

RANCH LAND VALUES

In a production cost investigation of this kind the value of the land is a most important factor, and some findings in this regard, by one of the best authorities on ranch land values in the United States, are therefore quoted below.

BASIS OF LAND VALUES

There is a strong tendency for men to overvalue ranch lands and then overgraze them or convert them into farms in an often fruitless effort to make them yield a normal return on their assumed valuation. The reputed price of these lands is usually based either on exceptional sales or on trades in which both parties over-value their properties. The productive powers of the land are, of course, taken into consideration, but only as one of several factors influencing prices paid. In addition to the productive value as grazing lands, other values enter in which are either only in part related or else wholly unrelated to the production of ranch products. These values may be classified as follows:

1. Productive value, comprising the grazing value, permanent improvement value, and site value.
2. Personal preference value.
3. Speculative value.

For example, a man may pay fifteen dollars per acre for a ranch. The productive value, we will say, is ten dollars per acre. This ten dollars may consist of, say, seven dollars for the grazing or productive value of the vegetation; two dollars and fifty cents for the value of the permanent equipments, such as watering places, wells, wind-mills, reservoirs, fences and buildings; fifty cents for the productive site value which may comprise many items, such as nearness to market, the convenience of the location with reference to shipping points, trading towns, and the reputation of the locality for the production of feeders, stockers, or breeding stock of quality. The remaining five dollars paid per acre must be divided between personal preference value and speculative value in varying proportions depending upon whether the individual concerned is the more inclined to yield to personal preference or to the game of speculation.

Personal preference has reference to those peculiar attractions which a piece of property may have to its owner or prospective buyer. These attractions are of the sort which yield personal satisfaction rather than economic return. If, however, these attractions, in addition to the personal satisfaction which they may yield, also possess more or less economic value, this element is included in productive site value, or productive value.

The speculative value of ranch lands includes all those chance gains which may be derived from the ownership of land. Men realize that there is a chance for lands to rise in value, due to many potentialities such as the possibility of discovering oils, gases and minerals, and of using the land for some higher form of farm or ranch production later on. Sutton County is an interior county, many miles from a railroad. The possibilities of getting a railroad and of further developing highways in and out in all directions have been capitalized in the speculative values of Sutton County lands. If the minerals are discovered or otherwise the land come to yield a more valuable product, if the railroad is built or the highways are perfected, what was formerly speculative value may become wholly or in part at least productive value simply by the accomplishment of the purposes formerly contemplated.

The question may now be asked, 'Was the ranchman, used as an example above, justified in paying fifteen dollars per acre for the land?' He may or may not have been, depending upon his several motives in buying. According to our assumption, if he merely buys the land because of its usefulness as a factor of production in ranching, he could, of course, only pay the ten dollars per acre. If it has attractions, however, to him as a place to live, he may raise his bid in proportion to his estimate of the personal preference value of the particular land to him and his family.

Moreover, he may be willing to pay something in addition purely as a matter of speculation for the possibilities of the land rising in value because of certain potentialities already discovered. As to how far one may go into the business of land speculation, no specific advice can be given in so brief a discussion as this. The amount which a rancher should pay for the speculative element in ranch lands will depend in part on the relative probabilities of the land in question yielding a more valuable product of one kind or another within a reasonable space of time, and in part on his financial circumstances. He must be able to take losses in case his land does not go up in price.

This entire question of the different sorts of value that are imputed to ranch lands is raised here not so much for the purpose of complete elaboration at this time, as to enable the ranchman to appreciate more fully just what he was paying for when he bought his ranch lands.

Obviously the ranch business proper should not be expected to yield a normal return on the investment in personal preference and speculative values. In the example above, the man who paid fifteen dollars per acre for ranch lands should expect, with good management, to secure a normal return on ten dollars per acre, and he should not expect the ranch business to produce rent, or interest, on either the personal preference or the speculative value.

Now the question may be raised, 'How may one identify and measure these several forms of value in a particular tract of land?' The productive value of a ranch may be identified and measured with a fair degree of accuracy by taking an

average of the net rents paid for the use of similar ranch lands and capitalizing it at the current rate of interest. If, for example, the net rent is sixty cents per acre on the average, then the average productive value of ranch lands in that section should approximate the amount of which sixty cents is, let us say, six per cent, or ten dollars per acre.

Personal preference value is rather easily recognized, but to measure it is a more difficult matter. Roughly speaking, it is the amount which a prospective ranchman would pay for the ranch of his choice over and above what he would pay for just as good a ranch situated as close to market, but which does not attract him so much as a place to live and conduct his ranching business. The amount will vary with individuals. It may be nothing in the case of one man and, let us say, ten dollars in the case of another. It will vary in amount in accordance with the strength of one's preference as modified by his ability and willingness to pay for satisfaction of a personal rather than an economic nature.

Speculative value may be recognized as that amount which a man will pay for ranch land over and above the amount which he will pay for the productive and personal preference values. It may be based on the prospect of a general rise in values due to an increasing demand for ranches or upon the prospect of discovering minerals or other productive uses for the land. It may even be based on the hope that the present owner may later on find a buyer whose personal preference is so strong for the particular tract of land that he will pay a satisfactory premium for it over and above its productive and speculative values. In other words, men quite generally speculate upon the personal preference of a future buyer.

In practice a ranch should not be bought on the basis of the net rent realized in any particular year, but on that of the average net rent covering a period of years, let us say, 11 to 22. One should also consider the comparative income and safety of similar investments in other forms of property.

If in addition to paying for the present productive powers of ranch lands, one wishes also to buy the potential productive power or speculative value, and to pay for the facilities to afford his personal satisfaction over and above those required for most efficient production, he may do so; but if he does, he must realize that in the one case he is speculating on land values and in the other buying a consumption good. It is obviously impossible, therefore, for the ranchman to charge the ranch business proper with interest or rent against either of these two unproductive investments or to include them in his expense of production.

It follows that the ranchman who pays for a ranch the productive value of it will justify, should in practice keep three sets of books. One set for his household expense in which every dollar invested in land, because of peculiar personal preference and pleasure, should be listed as a personal or family expense along with such items as luxurious food, clothing, automobiles, entertainment, residences, and other non-essentials to efficiency in ranching. Another set of books should be kept for the amounts of money invested in his lands as a matter of speculation. The profits or losses on this part of the investment in land can be determined only when the land is actually sold.

Lastly, a third and more important set of books for recording and balancing the items relating to the ranching business proper. On these books should be entered neither the personal

preference nor speculative value paid for the land but only the amount paid for its productive value on the basis of its normal ability to yield net rent.*

From the Government's standpoint, in considering ranch land values, the personal preference or speculative factor is not considered, for as the lessor and public trustee of these lands, a government's only concern is the productive value of these lands in their normal ability to produce a reasonable net rent, and, at the same time, conserve the resource and ability of such lands to produce.

People are transitory, but the land remains with us always, for its proper use and preservation for this and future generations, unquestionably is a concern of governments. The ability of such lands to continue to produce and contribute to the national income is a primary concern of the government. Improvement of land by scientific methods is of first importance not only to the government but also to the individual, if the land is to retain its normal ability to produce. This is a very important factor which has been overlooked by our methods in the past.

RANCH LAND MEASUREMENT

The measurement of these lands is important in establishing the cost of production. Many a rancher has measured his standing in terms of acres or of cattle, forgetting the forage or productive value, with the result of overgrazing and drought—he had acres but no forage for the number of head of cattle which he owned.

LAND MEASUREMENT

Land may be measured in terms of acres or in terms of its productive capacity and efficiency. When one speaks of the size of a given area of land he usually expresses himself in terms of acres or sections and fractions of sections. Where land is all of similar quality and devoted to the same general purpose, such a method of measurement is most convenient and accurate for comparative purposes.

When lands of widely different qualities and which are used in different ways are compared, however, the measurement in terms of acres and sections may be grossly misleading. Such a comparison may lead the man in Central Texas on 160 acres of the best black land to think of his cousin in West Texas on 3,840 acres as a land baron. The former, however, may represent more wealth, require greater managerial skill to operate and yield a greater return than the latter.

A more satisfactory basis of measurement in this case would be one founded on the most appropriate organization of the factors of production—land, labor, capital and managerial ability—in both farming and ranching areas. Some such measure as the requirements for the family-sized unit furnishes a sound basis for comparing sizes of units. Such a unit is based on the capacity and efficiency of land in relation to labor, capital and managerial ability. (The factors and methods of determining this unit are discussed in Chapter VL).†

*Texas Agricultural Experiment Station, Agricultural and Mechanical College of Texas; W. B. Bizzell, President; B. Youngblood, Director; Bulletin No. 297, July, 1922.

†Bulletin No. 297, Texas Experiment Station; B. Youngblood, Director.

It can be seen, therefore, that where lands of widely different qualities are compared the term in measurement of acres or sections can be both misleading and unfair. This authority suggests that a unit of requirements for family size, based upon the capacity and efficiency of the land is a better method of comparison.

The wide variation in the forage cover of different grazing lands in the short grass area, as well as the soil variations, have been shown in this Report, without taking into account the climatic factor. Some sheep ranches in the area have lands made up of reverted cultivated lands, yet the rental on such is in terms of acres, and the carrying capacity may be low, or at the best seasonal. A system of measurement, therefore, in terms of carrying capacity, based on their ability to produce, would appear to be a fairer means.

Of the total acreage, only a percentage of the surface, even at best, is covered with forage. The United States Forest Service makes use of the factor "forage-acre" in many of its studies. If the forage cover was only one-third of the surface, it would take three "surface acres" to equal one "forage acre", which shows recognition of these wide variations.

TAXATION OF RANCH LANDS

The matter of taxation of ranch lands is of great importance in the study of production costs of the stock grower, and if such taxation is not fair and equitable, and within the ability of the stockman to pay, then one of two things occur; he either becomes delinquent or goes out of business, by reason of such inability to meet that part of his costs which are fixed and inflexible in an emergency such as drought.

The principles governing the levying of taxes on range lands are, in the main, the same as for farming land. The production of range forage is, in the main, annual. Most of the forage produced in any one year is consumed in that year. Estimates of value are easily made. Taxes can be levied on the basis of capital value.

The problems of paying annual taxes in a range country, however, are somewhat more complicated. The annual crops of forage produced by land are sold through the production of range livestock. It takes two or more years to bring a range animal to market condition. Thus the animal production which is the result of the forage growth of one year, may not be sold in that year. Moreover, most of the range country is visited at irregular intervals with more or less severe droughts. The range refuses to produce the accustomed forage. Range animals of the proper age for market are unmarketable because of a lack of flesh. Under extreme conditions the ranchmen not only do not have anything to sell, but they are often forced to incur great expenses for feed and other supplies to prevent their livestock from starving. During such droughty years, the payment of taxes becomes extremely difficult and often detrimental to the best interest of the Government. The payment of taxes may take the very funds which should go to buy feed and keep stock from perishing.

According to the best authorities there are certain well-defined principles of taxation which must be observed if the proper amount of revenue is raised and raised with the least burden to the taxpayers. Adam Smith, (Adam Smith, 'Wealth of Nations' Book V, Chapter 2) stated these principles as follows: '(1) The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities . . . (2) The tax which each individual is bound to pay ought to be certain, and not arbitrary. The time of payment, the manner of payment, the quantity to be paid, ought all to be clear and plain to the contributor, and to other persons . . . (3) Every tax ought to be levied at the time or in the manner which is most likely to be convenient for the contributor to pay it . . . (4) Every tax ought to be so contrived as both to take out and to keep out of the pockets of the people as little as possible, over and above what it brings into the public treasury of the state'. According to these principles, the general tax does not meet all the requirements of a good system of taxation for the ranch country unless considerable latitude is provided as to the time of payment. It is believed that if a general property tax is to be used extensively in the ranch country, an extension of from six to nine months should be granted for payment during bad years.*

More has been dealt with in this Report on the subject of cattle than upon sheep, but below is quoted some findings by Mr. Kindt in his Economic Survey of the sheep range industry in Western Canada, made some years ago for the Dominion Department of Agriculture's Bureau of Economics, which bears out many of the present findings of this Report.

TAXES

Taxes paid in Alberta and Saskatchewan were among the largest items of expense. The problem of the assessment of range lands for local tax purposes might well receive more serious consideration. Some ranchers have purchased lands that were once farmed; in those areas debts were often incurred by the districts in keeping with a more intensive type of agriculture. Present owners of such lands are paying more in many instances than the lands are worth for range purposes. The item of lease and taxes amounted to 13 per cent of the total expenses on ranches in Alberta and 12.1 per cent on ranches in Saskatchewan. Due to the fact that sheep are grazed on the mountains under permit, the lease and tax item in British Columbia is not comparable.

CONSERVATION

3. That group of sheep ranchers in Alberta and Saskatchewan having between 1,500 to 2,000 breeding ewes received the largest ranch income under the prices prevailing at the time of survey.

4. The land use problem of southern Alberta and south eastern Saskatchewan is a highly complex one. The land occupied by sheep ranchers and the problems arising therefrom are an integral part of the general land use pattern. The findings of the survey have shown that those who have the

*Bulletin No. 297, Texas Experiment Station: B. Youngblood, Director.

most security on the unit which they operate, and can plan on a long time basis, are making the most progress, other things being equal. The purchase of lands by many to organize their ranch unit has often resulted in a burdensome debt structure.

5. Such problems as over-grazing, permanency of the business, indebtedness, and in fact many others associated with the operation of sheep ranches, are related to past land settlement policies and the resulting evolution and the use and ownership of land. One of the steps prerequisite to the formation of a land use program is a thorough type of farming survey, and subsequent preparation of a regionalized type of farming map, based on all the scientific information available concerning the use of land.

In his sheep ranching survey of Saskatchewan and Alberta, Kindt discovered that the item of lease rental and taxes amounted to 13 per cent of the total expenses of the sheep ranches.

Time does not permit the Appraiser to deal with all the factors of taxation upon grazing lands, but those which have been shown will demonstrate already that there is room for some adjustment in this matter. It is possible to deal only with a few salient factors in this regard so that the Department and the stockmen may be aware of some of the discrepancies surrounding this general subject in southern Alberta.

In no way has an attempt been made in this Report to determine the exact percentage of gross income of the ranches surveyed, which should be set aside for rental and taxes. The facts gathered in this commentary are from the records of Ranch No. 8 of this survey, which were deemed to be the most accurate and which showed costs over the longest period of time. The financial statement of this ranch, attached in the Appendix, covers a period of 13 years, from 1926-1938 inclusive. It shows some very outstanding facts and answers a good many questions which many stockmen, due to insufficient records, have been unable to answer in the past, and which has been responsible for much guess work in their operations. This outfit operates both in Saskatchewan and Alberta. Over a period of 13 years the total tax and lease rental charges of the ranch amounted to \$113,803.25, an average of \$8,754.09 per annum, which represented 17.75 per cent of gross income per annum during this time.

The present lease and tax charges of the ranch now amount to the sum of \$6,680.12 per annum or 13.75 per cent of the gross income per annum. This represents a drop of 4 per cent in these items, largely due to the adjustments which have taken place upon their Saskatchewan ranches, as a result of adjustments by the Saskatchewan Government made upon such matters, which are mentioned elsewhere in this Report.

The 17.75 per cent figure, however, the Appraiser deems to be very accurate for Alberta, it remaining at that figure here, due to smaller adjustments having been made, and covers a long period of years. A survey over a short period representing possibly one year's operations would likely show a higher percentage. The Appraiser is of the opinion that the Dominion

Department of Agriculture's Economic Survey for the short grass area, when released, will likely show this item to be 20 per cent of the gross income per annum or better when those figures are worked out.

The above mentioned survey is more comprehensive and covers a greater scope than the one which is herewith presented. It should be a matter of great interest, therefore, to the stockmen generally, and will give added information to many of the items dealt with in this Report.

For matters of comparison in the short grass areas, with lands leased by the stockmen from the Department of Lands and Mines or the Special Areas Board, which have been mentioned before, some blocks of privately owned lands are now dealt with.

Contained in the Eastern Irrigation District at Brooks, situated in the short grass area of Alberta, are approximately one million acres of grazing lands. Some of these are still owned by the District, while some have been disposed of by sale to the stockmen.

Of the lands owned by the District, with respect to the larger leases of 10,000 acres or over, these lands are leased for a period of 10 years at a rental of three cents per acre, where such lands are not embraced within a School Division or School District. If contained within a School District such are leased at a rental of six cents per acre, in order to cover the added tax item.

The average valuation of these grazing lands will run from 60 cents to \$1.00 per acre, with an average around 80 cents per acre. The mill rate in 1939 totalled 20 mills for Improvement District taxes; if in a Hospital District, three mills would be added; those lands in a School Division had a levy of 31 mills in addition, making a total of 51 mills, if in School Division and outside Hospital District.

This would bring the tax factor to slightly over the four cents per acre figure, with the stockman having the capital factor of fences in addition. Such range adjoins the Special Areas, and is subject to the same climatic conditions which they experience.

It must be pointed out that the rentals due the Eastern Irrigation District are payable in advance but that liberal discounts are allowed for payment by certain dates—20 per cent if rentals paid by August 1st, 1940, for example, 15 per cent allowed if paid prior to September 1st, 10 per cent October 1st, 5 per cent by November 1st, with the full amount due December 1st. Therefore, if on the three cent rate and the stockman pays by August 1st he would get his grazing for 2.74 cents per acre, plus the interest paid upon any monies borrowed, in order to pay these by that date.

It has been mentioned elsewhere that Kindt found the carrying capacity for sheep here at 9.2 acres per head. On a 5 to 1 ratio, this would bring it to 46 acres per head for cattle. In this Survey the basis taken is at 50 acres per head, with 10 acres for sheep.

The grazing lands of the Eastern Irrigation District suffered very greatly from overgrazing in the past, especially the sheep lands which are greatly infested with Blue Burr, especially around the natural water courses and immediate vicinity thereof. Due to improved climatic conditions, during the growing season in the last three years, considerable improvement in forage cover has taken place on these ranges, as most of the more palatable species have produced an abundance of seed. Their present carrying capacity can be maintained as a result and with careful management some improvement made. One rancher there with cattle has found that by carrying fewer head, he has been able to get an average gain of 50 pounds per animal more off grass than with previous methods. This bears out Mr. Warren's statement of his experience in Wyoming.*

Immediately to the south of the Eastern Irrigation District lie the lands of the Canada Land and Irrigation Company, Limited, on the south side of the Bow and north-west of the South Saskatchewan Rivers. Of the lands owned by the Company, some 140,000 acres are grazing. These lands are situated in the short grass area and are subject to the same climatic conditions as others in this region. From all known climatic data, these lands, within the pocket of these rivers and the Belly to the south, are in one of the normally driest areas within the province.

The forage cover at the present time compares favourably with the range lands of the Eastern Irrigation District and the Special Areas lands to the west and north-east and contain a large amount of abandoned dry farm lands of equal carrying capacity to the Eastern Irrigation District.

This Company, with an original investment of slightly over 15 million dollars, pays approximately 14 per cent of their gross revenue in taxes which amount to a total of approximately \$16,000 per annum, of which \$6,000 represents the taxes upon their grazing lands.

These lands run in assessed value from \$320 per quarter section or \$2.00 per acre to \$500 or about \$3.25 per acre.

The company leases the grazing lands at an annual rental of four cents per acre, payable in advance, as some of these lands lie within school division boundaries. A check of their books shows that the actual receipts from grazing rentals approximates the tax bill on these dry lands. The rentals are payable to the company in advance on November 1st of each year for the year succeeding, such date being arrived at, after conference with the stockmen concerned, as the most convenient time to pay such rentals.

Sheepmen using these lands stated to the Appraiser that under present conditions they could meet these rentals but that under some of the previous low prices and drought they had had difficulty in doing so.

On the Milk River Ridge at the extreme west end of the short grass area of Alberta are located the grazing lands of

*James Mitchell, President, Western Stock Growers, Medicine Hat and Tilley.

the McIntyre Ranching Company and the adjacent range of the Knight Sugar Company.

These lands were all purchased at one time from the Alberta Railway and Irrigation Company for around \$1.00 per acre and comprise some of the finest foothill range available in Western Canada, possessing higher elevation, well watered and with greater precipitation.

The McIntyre Ranching Company have on their ranch one of the best, if not the best, commercial herd of Hereford cattle in Canada, as well as a fine foundation herd of purebred Herefords, from which many a stockman in Canada, by reason of the high class of range bulls which the ranch offers for sale from time to time has received his start. So outstanding is this stock that anyone familiar with range cattle can recognize the McIntyre Ranch origin without even seeing the brand.

The grazing lands of this company are located within Improvement District, No. 8, and the assessed value of an average quarter section therein runs at \$800, with the taxation, including hospital tax, totalling \$8.80 per annum, or $5\frac{1}{2}$ cents per acre.

Those of the Knight Ranching Company, assessed at \$850 per quarter section and being situated within the Raymond Municipality, have a total mill rate of 10 mills, with a tax of \$8.50 per acre per annum, or about $5\frac{1}{2}$ cents per acre. Should the mill rate total 40 or 50 mills, however, as prevails in portions of the Eastern Irrigation District on dry grazing lands, it would amount to about 20 cents per acre.

The carrying capacity ratio for these lands, as against the lands of the short grass area farther to the east, is about two to one. This would make the carrying capacity, therefore, about 1 to 25 acres for these ranches per animal unit.

It must be pointed out that these lands have been assessed as high as \$9.00 per acre, and it has only been after continual representation to the assessing authorities that it is now in the vicinity of \$5.00 per acre.

If money is worth 5 per cent, and the rental or taxes amount to three cents per acre, which has been found to be a fair limit for the short grass area with the carrying capacity 1 to 50 acres per annum generally speaking as an average, then the rental return per quarter section is \$4.80 per annum. By reversing the fraction, the fair assessed value of such grazing land, in the Appraisers opinion, should not exceed 60 cents per acre, or \$96 to \$100 per quarter section as an average. The poorer lands would represent a lower figure from the forage standpoint, whilst the better lands with more palatable forage cover for the short grass area—depending, also, upon water facilities—would be valued at a possible maximum of \$1.00 per acre.

Considerable improvement has taken place in the assessment of the range lands of this province, though there appears to be still a difficulty in getting people to divorce from their minds the old fictitious values of boom day figures when dealing with grazing lands. This, despite the experiences of the last 20 years or more, which showed that the climatic factor in the

average years must be the controlling factor, together with the ability of the land to yield a fair productive value over such term of years.

In fairness to the stockman, the tendency for school districts and school divisions to endeavour to embrace from time to time more range lands within their boundaries should be pointed out. This continues to be done in spite of the stockmen's protests that such action adds to his costs of production. A similar problem continues to exist apparently in the Western States.

Generally speaking, the stockman due to his isolated situation does not get the benefit of schools for his children, and in many cases has to send them away from home for schooling. Road facilities are generally far from good. If he has a telephone, it is owned and maintained by himself. He gets police protection, and as a citizen is willing to pay his fair share of the general taxation load upon the assessment of his titled lands, such assessment to be commensurate with the ability of the land to produce, which is, in his case, its carrying capacity.

As the question of taxation and assessment of range lands is a specialized study in itself, the Appraiser has only dealt in a general way with the subject. It would appear, however, that more study will have to be given to the peculiarities of range lands, their carrying capacity and ability to produce over an average of years, if a fair basis of assessment of range lands is to be arrived at—an assessment which shall be within the ability of the stockmen to pay and which shall also be commensurate with the returns from his product.

TAXATION—ARREARS

An analysis of the arrears of rental and taxes owing the Department of Lands and Mines in Alberta will show that about 90 per cent of such arrears are for taxes and not for rental proper.

The majority of such arrears were accumulated through no fault of the stockman. They were due to a series of circumstances such as drought, overgrazing and periods of low prices, when something had to go into arrears if the individual was to stay in business. The arrears, therefore, were allowed to accumulate, when such fixed charges could not be met. The accumulated interest has been an added burden to this load even with the improvement in the price factor for the stockman's product.

In order to cope with this problem, the Minister of Lands and Mines has endeavored to meet the situation by permitting stockmen in this position to apply for renewal of their leases for a new period of 20 years, with the payments of such arrears spread over 20 equal payments, without interest after December 31st, 1939. This would reduce the load, with the addition of annual rental payments, giving the stockman, as a result, added financial stability. The solution to this problem was well received by the stockmen.

In view of the fact, however, that the Province of Saskatchewan saw fit to cut arrears by 50 per cent and reduce current rentals the same amount, and also in view of similar action being taken in the Western States, such as Montana and Wyoming—faced with similar conditions—which immediately cut their current rentals by the same percentage, further consideration for Alberta should undoubtedly be given to this question.

If such arrears are reduced, then in fairness to the individuals who have paid their rentals at considerable sacrifice in order to keep them in good standing, these men must be given consideration in the matter of credits for a reasonable period of time. In the case of Saskatchewan, such men were given a credit of six months free rental, and no interest on the arrears of these individuals whose arrears had been cut 50 per cent.

As three cents per acre per annum rental appears to be the maximum rental charge capable of being sustained in the majority of the short grass area, then where such rental charge, including taxes, on grazing leases equalled four cents per acre, it would appear that consideration of a 25 per cent reduction in these arrears would be deemed a fair one. The Appraiser, in this connection, only refers to those arrears from 1932 to date, as prior to 1932 too many factors enter into the question to be dealt with in this Report. The consideration of the 25 per cent reduction would be a fair one in view of the longer time given to pay such arrears, namely, the 20 year period.

During such a period of drought and low market prices, it would appear to be definitely unfair to charge interest on these arrears which had been accumulated by a force of circumstances very largely beyond the stockman's control. The Appraiser, therefore, suggests that special consideration be given to the question of interest on these arrears wherever it has been shown that such interest is the direct result of adverse conditions which prevailed—low prices or drought—such as were experienced in combination during the period mentioned. The question of such interest being either reduced or eliminated entirely should in all fairness be advocated.

Some complaint has been registered by the stockmen in having to pay their lease rentals and taxes in advance. The payment of rentals in advance is, however, customary on the American continent. In Alberta both rental and taxes on grazing leases are collected at the same time, one year in advance. Payments of land taxes are made for the current year and if this is arranged for by certain dates in advance of the actual net date, the tax-payer is permitted certain discounts. It would appear, therefore, in fairness to the stockman, that the portion of his rental representing actual taxes paid in advance, is deserving of consideration to be given in the matter of allowing certain discounts.

It must be pointed out that as long as grazing rentals are set and levied upon a flat rental per acre basis, the matter of accumulated arrears and its attendant burden will occur at periodic intervals in the future as in the past, after periods of low prices for livestock or drought, or both in combination,

unless a method of levying such rentals will automatically take care of both these factors. It has been shown elsewhere in this Report that when forage value could not be given, due to drought, a stockman might have many acres but no grass. The levy, however, remained the same.

SHORT GRASS STOCK GROWERS' ASSOCIATION —PROPOSALS

In an investigation of this kind, several factors have to be noted, in considering such proposals as were set forth by the Short Grass Stock Growers' Association of Medicine Hat to the Provincial Government. They are as follows:

1. The basis of necessity for such proposals,
2. Their practical application,
3. The position, in the public interest, of the Government as Public Trustee of the Grazing Lands,
4. The position of the stock grower under such proposals,
5. The public interest in such a scheme,
6. The permanency of tenure under such a scheme.

1. It has been shown in this Report that there has never been a definite land policy in Canada, which recognized that certain lands, because of their soil, topography, or climatic factors, or the combination of all these factors, were primarily fitted and best suited economically to the range grazing of livestock, a consideration to take precedence over other forms of agriculture.

The result has been that over large parts of the short grass area of Alberta much land has been placed under cultivation, which would have been better fitted economically for range, together with the fact that, due to the checkerboard pattern resulting from the lack of land policy, the stock grower has had to curtail his operations, as a result of securing the poorer, rougher or abandoned farm lands. This entailed rising cost of production, due largely to increased land purchases, and greater capital investment in equipment necessary for the proper conduct of the business under modern conditions.

This rising cost for equipment, etc., has generally resulted in too high an assessment of deeded lands which were suitable only for grazing; an assessment based upon false land boom prices and the premise that such lands were suitable for farming.

The grazing lease rentals have always been levied on a flat rental basis without taking into account the fact that actually there can be no fair rental basis on a flat rate for grazing lands.

Such an assessment disregards the grazing value of the lands and disregards also the fact that it would be more equitable to establish the lease price upon the basis of the carrying capacity of the land, i.e., a basis of area per head or pounds of beef secured.

In the light of our present day knowledge and past experience, the majority of the lands in the short grass area, due

to general climatic conditions, must be classed as semi-arid and arid grazing lands. Men have improperly estimated the agricultural possibilities of these lands. With such knowledge and experience, therefore, arid and semi-arid lands should be recognized as grazing lands, and treated as such, until it has been demonstrated that sufficient crops, either forage or of grain, can be grown upon selected areas during the dry years to guarantee, in conjunction with associated grazing land, a living to the occupant; in other words, a reasonable standard of living for an average family.

Climate, despite the fertility of the soil in many parts of the short grass area, has been shown to be the controlling factor, and the stockman despite his adaptability has always had to contend with drought at some periods of the year, some years more extensively than others, when it has been difficult for him even to obtain feed for his livestock.

Disastrous late winter storms have often followed such drought years and winters with cold spells of long duration, necessitating the purchase of high priced feed from outside sources in order for him to stay in business at all and bring his stock through the winter.

The added burden of long periods of feeding have added to his costs of production, especially where it has not been possible for him to develop small irrigation schemes with his own resources in order to assure an adequate supply of feed during periods of drought.

The Appraiser has found ranchers in this survey, who in the spring of 1938, through no apparent fault of their own, lost in the severe spring blizzard, as high as 20 per cent of their herds, which meant the difference between profit and loss in 1939, as well as the loss in weight of the survivors, which added still further to the cost.

2. It has been shown in this Report that a system of grazing rental fees which takes the price factor into consideration has been worked out and is in operation by the United States Forest Service upon the National Forests of the Western United States.

Such a system works to the advantage of the grower, in that it is proportionate to the average price received for his products for the 11 far western States. It has been shown that the growers have been well satisfied with the operation of such a scheme, instigated after representation by them that the price must be taken into consideration.

The price averages are worked out by the Federal Bureau of Statistics for the above scheme. The price basis here can be taken from the averages worked out by the Dominion Bureau of Statistics each year as the 1939 average prices on the Calgary market, which have been used in this Report.

The Wyoming Stock Growers' Association have had a couple of delegations to interview the Wyoming State Commissioner of Lands, requesting that rentals upon State grazing lands take the price factor into consideration, which shows that others

have reached the conclusion that the price factor must be reckoned with. It may be pointed out that many of the members of the Wyoming Association pay rentals on forest lands on the basis of the National Forest System schedule of grazing fees mentioned above.

FORAGE FACTOR

The short grass stock growers' suggestion of the factor of "250 lbs. annual gain per head on grass", appears to be a fair one. The suggestion of such factor was based upon the weights kept on a herd of 2,600 head of steers and spayed heifers shipped off grass, with weaning weight 350 lbs.; 600 lb. yearlings; 850 lb. 2 year olds; 1,000 lb. 3 year olds; 1,350 lb. 4 year olds; the 2,600 head averaged 1,414 lbs. as 4 year olds off grass. There is a spread of 76 lbs. in the 4 years or about 19 lbs. per year in this case. This was a herd from the Ross Ranching Company some years ago.

The Appraiser found in his investigations that there was agreement among livestock men, experimenters and grazing lands administrators, in the United States that 250 pounds could be considered a fair average gain upon grass for all classes of cattle. Such opinion was also concurred in by those in Canada to whom the question was put; also that it would likely vary from 200 to 350 pounds depending upon the class of cattle and the forage conditions, but that 250 lbs. could be deemed a fair average for all classes of cattle under varying conditions.

The Dominion Range Experiment Station has found in experiments on gains in weights with varying intensities of grazing, that in the nine year figures yearling heifers and steers gained from 298 lbs. to 333 lbs. on an average. It is recognized, however, that younger cattle make higher gains upon grass than more mature animals, in which such gain is slower. The 250 lbs. average gain per year appears, however, to be a fair and average figure to accept. This can easily be changed in the future should actual experimental figures disprove this figure to be either too high or too low.

CARRYING CAPACITY FACTOR

In this Investigation and Report, the carrying capacity factor has been taken as 50 acres per head per annum as a fair average of the carrying capacity of the ranges throughout the short grass area under present conditions and based upon a 12 months lease period.

The Dominion Experiment Station has found that it requires 40 acres for summer grazing per animal, plus 20 acres of winter grazing, to secure the best results in the short grass area, but it must be pointed out that not all the ranch would be grazed at these two rates continuously for the 12 months. The Appraiser, therefore, has found that the consensus of opinion of stockmen who have been interviewed is that the rate of 50 acres per animal per annum is deemed a fair basis at this time.

It is advisable to mention in this connection that taking the 50 acres per animal unit as the carrying capacity for beef cattle, a satisfactory unit is established as a conversion factor for sheep in the short grass area.

It has been shown elsewhere in this Report that the 5 to 1 conversion ratio of sheep to cattle unit is the acceptable ratio for the short grass area. From a carrying capacity standpoint, this would appear to be correct for Mr. Kindt of the Dominion Department of Agriculture, in his survey of the sheep industry in Western Canada some years ago, found that the carrying capacity of the range in the Brooks-Tilley area worked out at 9.2 acres per sheep, which is fairly representative of the short grass area of Alberta.*

It has not been possible in this Report for the Appraiser to consider the lamb market and wool questions. These would have to be worked out in co-operation with the sheepmen. It might be pointed out, however, that the 250 lbs. average annual gain of cattle on grass, with a five to one ratio for sheep, would work out at 50 lbs. per head for sheep as the gain per head on grass. This might perhaps be considerably on the light side when considering lamb weights. A 4 to 1 ratio for gain in weight might, therefore, have to be taken in considering the sheep question, which would make the gain at about 62.5 lbs. per head when estimating the gain on grass by lambs, which come off grass all the way from 65 to 78 lbs. The Appraiser is not prepared at the present time, therefore, without further study of the sheep phase question, to state at what ratio sheep should be considered in the matter of weight. A separate set of figures might have to be used in the case of the sheepmen the same as in the western States, when a different marketing period is taken for sheep than for cattle, in arriving at the base rate used by the United States Forest Service.

If a 5 to 1 ratio is taken, however, for sheep, and the cattle market used as the basis for such computation in the gain on grass, the sheep man's rates would fluctuate with the cattle markets, which might or might not be considered fair. Speaking generally, the same conditions affecting the cattle market also affect the lamb and wool markets, as all are more or less in sympathy with one another. Therefore, in so far as the actual effect upon grazing lands is concerned, it would appear to be to the advantage of sheepmen to accept the ratio of 5 to 1 based upon the cattle market as they are generally grazing the poorer of the short grass area lands—lands which contain the greatest amount of reverting cultivated lands which possess actually a lower carrying capacity and should, therefore, be at a lower rental per acre than more favourable pastures.

The Appraiser found that the majority of the sheepmen interviewed expressed the opinion that with a stable wool market and the price of lambs ranging from six to 7½ cents per lb., they should be in a position to realize a little money from their operations after a very difficult period, (1929). The average price per cwt. for lambs at Calgary runs from \$6.37 to \$7.47.

*See address quoted under "Records" of this Report by Mr. E. Warren—"Earnings, Cattle, Sheep—Long Period—5 to 1 Ratio."

The average price for sheep of all classes per cwt. at Calgary in 1939 was \$6.67, compared with \$6.17 for 1938, \$6.00 for 1937, \$5.00 for 1936 and \$4.75 for 1935. This shows the general improvement which has taken place in the sheep market since 1935.

In connection with the average weight of lambs marketed from Alberta sheep ranches, Kindt, in his Survey published in 1936, covering the sheep ranching industry, found such to be 64.9 lbs. This was an average taken from 62 sheep ranches in Alberta, and can be regarded as a reliable guide.

POSITION OF GOVERNMENT

3. The position of the Government of the Province of Alberta in the matter of these proposals is as follows: In the foregoing portion of this Report it has been shown that the prime interest of the Government, as Public Trustee and Lessor of these lands, is that a fair return be made from them when used for the best purpose for which nature has endowed them; that the great natural resource, grass, shall at the same time be properly utilized and preserved for this and future generations by better employment of the natural laws which govern it; that the industry utilizing such may be assisted, as far as possible, in stabilizing its position so as to better meet the hazards of the business due to the industry's importance in the provincial and national economy; that a flat, grazing rental fee, it has been shown, may be decidedly unfair, and may be exacted many times when value cannot be given during drought periods, etc., or in periods of low prices; that under the short grass stock growers' proposals, the Government still secures full rental value dependent upon carrying capacity and market price. With no carrying capacity there could obviously be no value given and, therefore, no lawful or moral right to collect rental on acres without forage, which has happened so often in the past, with many of such accounts still remaining uncollected; that it has been shown that the Government is not concerned with the personal preference factor in land values, nor the speculative value. The Government is, therefore, only concerned in the production of a net rent, secured on the ability of the land to produce, in this case forage or pounds of beef, which is the true criterion of grazing lands' value. The Government as Trustee will be assured of its fair share of the utilization of grass, one of the most important of natural resources, to a greater extent under these reforms than under the present flat rental per acre basis.

Any investigation of production costs in the livestock or grazing industry is a difficult one due to the many factors involved in such a study. The costs of operating the same ranch may vary a great deal from year to year due to drought, poor calf crop, winter storm hazards involving the feeding of large amounts of supplementary feeds, and even involving in such years added expenditures for the purchase of such. Grasshoppers may clean the fields of one ranch and not the other in the same locality; hail storms may affect the carrying capacity; a serious prairie fire may sweep the range of one ranch and be stopped before reaching the range of the next, adding to the

costs of the unfortunate one; an infestation of mange may affect one ranch herd, adding to costs, and may not bother the neighbouring ranches.

With these factors in mind, difficulties are added to. Clear and adequate records of the individual ranches should be kept over a term of years for the full information of the investigator, so that reasonable averages over such term of years may be easily determined and some of the hazards and variations allowed for in arriving at conclusions. It should also be stated that different investigators, under such circumstances, may interpret the findings differently and possibly both may be right from their impartial viewpoints, though perhaps at variance with the ideas of the industry.

It appears, therefore, that a real opportunity is presented to the Government, under such proposals of the Short Grass Stock Growers' Association, to adequately determine, for the benefit of all concerned, full and complete production cost figures which will include all the factors and hazards, if all the ranches, willing to operate under such experiment, will have and use a uniform and simple system of ranch bookkeeping. The Appraiser has in mind the Mont. H. Saunderson system, a sample of which is attached to this Report, as the best for the purpose.

The word opportunity is definitely used here as it would be the first time that a real, co-operative effort to determine actual facts about costs and methods would be launched. The men actually engaged in the business, which is their livelihood, would be the experimenters. The Short Grass Stock Growers' Association has offered a number of their members to embrace such an experiment, and no doubt others of the membership would also volunteer to make it more extensive in scope as to territory and conditions, with a view to arriving at a set of production cost figures for the industry which would, as nearly as possible, be accurate.

The two following methods are suggested in using the formulæ, which include carrying capacity and the price factors for the Government to follow:

1st. That the Government should split into whatever ratio may be determined upon by mutual agreement, the excess over and above the determined cost of production for all classes of cattle, stating, for example, 5 cents per pound, and taking the five factors used in this investigation into consideration, namely, interest on capital investment, insurance (hay, etc.), annual running expenses, depreciation and amortization of the lease on a 20 year basis.

If, however, the above method is adopted, it must be understood that it makes the Government a partner in the business, and should the price level or carrying capacity force the returns below the stockmen's production cost figure, then the Government must be prepared to share the loss directly with the producer regarding reimbursement in one form or another.

2nd. The alternative is for the Government to take a definite percentage of the gross value of the grass as determined by the formulæ and as suggested by the stock growers themselves. This

is the method favoured by the Appraiser, as it remains a tax or rental for the use of the forage—a function of Government—and fills most of the factors of tax as set forth by Adam Smith's definition, shown under taxation—definite, convenient for the taxpayer, and within his ability to contribute to the support of government.

The percentage of such total value of the forage, which the Government should take, based upon the price and carrying capacity factors, was not definitely determined upon by the committee, but the association in their brief suggested that this should not exceed 10 per cent of the gross value. The committee suggested either 7 or 10 per cent but were unable to determine which figure would be the fairest to all concerned. After working out several examples, however, based on the average 1939 prices on the Calgary market, the Appraiser suggests 10 per cent as being a fair figure commensurate with the value of the forage and giving a fair return to the Government in rental of same.

An example, calculated from the smallest ranch investigated, clearly demonstrates how the sliding scale, based on these factors, works out. This example follows the scheme for the producer, and is prorated back to give some idea of the flat cost per acre, on the 1939 average, and a carrying capacity of 1 head of cattle per 50 acres of land under lease.

This scheme is based upon the average price and average carrying capacity of the same kind of land under similar climatic conditions. The Government is not, therefore, concerned if the individual, through better management or better quality, sells for more than the average. That is the producer's premium for quality or superior management. Nor is the government concerned if the producer feeds all winter and sells in the spring, or at any other time. The basis is the average of the year preceding, as set forth by the Dominion Bureau of Statistics for the Calgary market. This will care for the man who has large investments in pure bred bulls which are of higher quality than those of his neighbour, who has added land capital costs.

It should be pointed out here that any adjustment in the carrying capacity factor can be made through setting up zone committees in different zones, as suggested by the association, to assist the Appraiser in adjusting the individual carrying capacity of any ranch, taking the rancher's representations into consideration, should he feel that the average carrying capacity is unfair; or should the Appraiser and committee feel that the individual ranch is better than average for the area, when such factor may be recommended for change.

The Appraiser suggests that every rancher in the short grass area should have fenced check plots in each of his large fields for his own information, as well as for the information of the Appraiser and committee to represent a real yardstick of the increase or decrease in the carrying capacity of that field or in the total ranch. In case of a dispute, when this could not be amicably arrived at by the Appraiser and the zone committee, the services of the Range Experiment Station agrostologists

would no doubt be available to plot and check the range by quadrate and transverse surveys to definitely settle the question. This would also enhance the records and the scope of the experimental work of the station, and these check plots on the individual ranches would be of great assistance in any case to the station in its work.

POSITION OF THE STOCK GROWER UNDER THE PROPOSALS

4. Under the present system of setting grazing rates, even by the zone method as existing in Alberta, the stock grower has no means of redress if his fields are burned off by disastrous prairie fires, or if grasshoppers clean his fields of forage or if they are subjected to hail, any one of which may happen and on many occasions has happened.

But under the method which takes carrying capacity and price into consideration, then the Appraiser automatically, on receiving a report from the stock grower, investigates, with the assistance of the zone committee members. With no carrying capacity there can be no rental charge, while with partial damage the carrying capacity ratio would be raised and the rate lowered. Drought is taken care of under this heading.

If the price factor drops then automatically the producer's grazing rates drop in proportion. If a man has a fixed charge to meet of, say, one dollar, and has only five with which to pay it, it is more difficult for him to discharge this obligation than if he had ten available. If the price factor rises then his rates naturally will increase in proportion but, as pointed out, he is better able to pay such than to meet a fixed charge under present circumstances when prices drop below his average production cost, as has occurred many times in the last twenty years. Such are the times when arrears of all kinds are accumulated and proper repairs and allowances for depreciation cannot be set aside or proper provision for insurance (or adequate supply of feed) cannot be made. The Appraiser has found that most ranches, which had heavy storm losses in 1938, had made a start on irrigation schemes to provide winter feed resources to a greater extent but due to drought conditions and poor prices this development had to be necessarily postponed. With improved prices, however, and assistance, in many cases by the Prairie Farm Rehabilitation Act, greater provision is being made for a reserve of winter feed than was possible in the past. This is shown in the value of the feed on hand, in the appraisal for this Report, and shown also on the large analysis sheet.

With greater permanency of tenure the stockman is better able to provide for such development, and is further cutting his costs by his own ingenuity, such as demonstrated on one ranch this year with bulldozer caterpillar tractors, power mowers and a travelling stacker on a caterpillar built on the drag-line principle, which builds better stacks more quickly, and at less cost than under former methods.

**PRICE RANGE OF CATTLE SOLD ON CALGARY
STOCK YARD, 1939**

Steers up to 1,050 lbs.—

	CALGARY	
	Low	High
Choice	\$5.75	\$7.00
Good	4.75	6.75
Medium	4.50	6.25
Common	3.50	5.50

Steers over 1,050 lbs.—

Choice	5.75	7.25
Good	4.75	6.75
Medium	4.50	6.25
Common	3.50	5.50

Heifers—

Choice	5.00	7.00
Good	4.50	6.50
Medium	3.75	5.75
Common	3.00	5.25

Fed Calves—

Choice	6.00	7.75
Good	5.50	7.00
Medium	4.50	6.50

Cows—

Good	3.50	5.50
Medium	2.75	4.75
Common	2.25	3.50
Canners and Cutters.....	1.50	3.00

Bulls—

Good	3.00	4.75
Common	2.50	3.75

Stockers and Feeder Steers—

Good	4.00	6.50
Common	3.50	5.25

Stock Cows and Heifers—

Good	2.50	5.25
Common	2.00	4.00

Milkers and Springers.....

.....

All cattle	\$1.50	\$7.75
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This is submitted in order to give grades and price range upon the Calgary market for 1939 for all classes of cattle. As a rule very few of the ranchers' stock fall within the lower grades unless through disease, culling or results of drought.

It was suggested that as the majority of ranch cattle were marketed from July 1st to December 31st, a six months average be taken but exact figures only were available for these classes.

CHOICE BUTCHER STEERS UP TO 1,050 LBS.

Month	Calgary
July	\$6.50
August	5.96
September	6.73
October	6.50
November	6.50
December	6.75
6 Mos. Average.....	\$6.49

GOOD BUTCHER STEERS UP TO 1,050 LBS.

Month	Calgary
July	\$6.10
August	5.32
September	6.02
October	6.10
November	6.10
December	6.20
6 Mos. Average.....	\$5.97

GOOD STOCKER AND FEEDER STEERS

Month	Calgary
July	\$4.69
August	4.54
September	5.27
October	5.75
November	5.69
December	5.71
6 Mos. Average.....	\$5.27

GOOD TO CHOICE VEAL CALVES

Month	Calgary
July	\$5.75
August	5.75
September	6.97
October	6.22
November	6.22
December	6.98
6 Mos. Average.....	\$6.31

6 Mos. Average of all Classes.....6.13 cents per lb.

The following figures give the Calgary average price for all cattle for the last five years. This is followed by the same for calves—the average of all classes, plus calves, was taken.

YEARLY WEIGHTED AVERAGE PRICES PER CWT. OF THE TOTAL SALES ON STOCK YARDS

	Cattle				
	1939	1938	1937	1936	1935
Calgary	4.76	3.66	3.60	2.85	3.20

	Calves				
Calgary	5.41	4.63	4.25	3.00	3.55

Calgary Average, 1939—5.08 cents per pound.

MONTHLY WEIGHTED AVERAGE PRICES PER CWT. OF THE TOTAL SALES ON ALL STOCK YARDS

Month	Cattle 1939
January	\$5.05
February	5.26
March	5.35
April	5.35
May	5.35
June	5.25
July	4.74
August	4.49
September	5.39
October	5.06
November	4.97
December	5.25

Note close comparison Calgary average.

Yearly Average—5.09.

In order to give the reader a proper conception of the market price factor, the following, by the Marketing Service, Dominion Department of Agriculture, gives the averages for 1935-1939 at Calgary market.

AVERAGE PRICES OF CATTLE SOLD AT CALGARY

Grading	Average Prices				
	1939	1938	1937	1936	1935
Steers up to 1,050 lbs.—					
Choice	\$6.55	\$5.87	\$6.70	\$4.62	.....
Good	6.03	5.05	6.23	4.21	\$5.02
Medium	5.57	4.18	5.41	3.59	4.14
Common	4.84	3.27	3.53	2.64	2.88
Steers over 1,050 lbs.—					
Choice	6.44	5.73	7.02	4.72	.....
Good	5.90	5.10	6.27	4.21	5.04
Medium	5.50	4.19	5.24	3.60	3.93
Common	4.64	3.33	3.60	2.60	2.55
Heifers—					
Choice	5.95	5.26	5.96	4.58	.....
Good	5.32	4.37	4.74	3.29	3.82
Medium	4.79	3.75	3.97	2.69	3.03
Common	4.25	3.14	2.95	1.93	2.39
Fed Calves—					
Choice	6.70	6.34	7.44	4.66	.....
Good	6.15	5.36	6.32	4.13	5.43
Medium	5.42	4.64	4.91	3.38	4.30
Cows—					
Good	4.07	3.27	3.50	2.33	2.50
Medium	3.46	2.63	2.79	1.79	1.82
Common	2.99	2.22	2.23	1.38	1.28
Canners and Cutters.....	2.22	1.61	1.52	.96	.82
Bulls—					
Good	3.93	3.11	2.96	2.16	1.99
Common	3.31	2.44	2.14	1.55	1.35
Stocker and Feeder Steers—					
Good	5.13	4.02	4.19	2.93	3.58
Common	4.36	3.13	2.67	2.02	2.47
Stock Cows and Heifers—					
Good	3.75	3.00	2.78	2.01	2.40
Common	3.06	2.36	1.75	1.49	1.61
Milkers and Springers.....	.....	.....	.....	.....	.....
Total Cattle	\$4.76	\$3.66	\$3.60	\$2.85	\$3.20

It can be seen from this what a poor price prevailed in 1935 and 1936 for cattle with gradual improvement since that time.

4. The Appraiser has taken the average price for all cattle on the Calgary market for 1939, including calves. This average works out at 5.08 cents per pound. To acquaint the producer and the Department of each one's relative position under the scheme, the following example of Ranch No. 1 is used. This is the smallest cattle ranch and is on the edge of a Rate zone township.

EXAMPLE, RANCH No. 1

Cattle, 1939—Average price, 5.08c per lb. Calgary.

Amount of Lease—2,080 acres, carrying capacity.

Ratio—1 head per 50 acres.

Carrying Capacity—42 head, mature stock (Grass).

Average Gain—250 lbs.

Formula—42: 250: 5.08.

Total Forage Value—\$533.40.

Rental-price and Carrying Capacity Basis—10% of \$533.40 or \$53.34.

1940 Rental per Acre—\$53.34 for 2,080 acres or 2.56c per acre.

It can be seen from this that if the average Calgary price equals 5 cents per pound for cattle, then, with the carrying capacity factor constant at 50 acres per head, and the gain per head on grass constant at 250 pounds, and 10% taken for rental, that this will equal slightly over two and a half cents per acre. From the foregoing, the producer can easily calculate from the price range what his rental will be for the ensuing year.

From the departmental standpoint, a sliding scale for rapid calculation can be worked out with these facts and figures in mind, so that no greater work is entailed at present in calculating such grazing rentals. This is not as involved as the United States Forest Service formula in use in the Western States.

With other factors constant, if the Calgary average price went to 9 cents per pound, the rancher's rental would work out at 4½ cents per acre. The rancher has seen such prices. He has also seen about half the present average price, with his rental nearly constant through such period of low prices combined with prolonged drought conditions.

It might be pointed out that this ranch has encountered similar conditions to that prevailing in some of the special areas of the province, actually calling for a rate equal to that of the lower rates of such areas, namely two cents per acre, with a long feeding period in the winter becoming necessary. This ranch is situated in one of the pockets not affected by the chinook winds, the only effect from which, in this locality, is to crust the snow.

This man is an old-timer. When he first settled in the area, he made a comfortable living from his livestock, with plenty of range available, but with the advent of land settlement policies of the past, his range was curtailed by farming. He was forced

to purchase land and attempt to grow some wheat in an endeavour to "pay out." The district's record over a long period of years is an average of 8 to 9 bushels per acre with a good crop in an exceptional year. It is an ideal grazing district with an economic ranch unit, but under both types of agriculture, without such unit, it would become a very hazardous occupation.

If the Short Grass Stock Growers' Association's proposals had been operative during the extreme drought period, and period of low prices as in 1935, when the Calgary average price, including calves, was \$3.38 per 100 pounds, this stockman's rental would have been approximately 1.19 cents per acre. This is presuming that the carrying capacity of his lease remained constant, which was not the case, as through drought this factor was reduced, which would have reduced the rental to below the advantage enjoyed by the Saskatchewan competitor, leaving him to face an accumulation of arrears as a result of these conditions.

The producer, however, must be prepared and willing to co-operate under the scheme by paying a much higher rate with increased prices and improved carrying capacity when years of more favourable climatic conditions arrive.

PUBLIC

5. Under the proposals of the Association, the general public would become more interested in the grazing industry than at present. A devastating storm is followed by heavy stock losses. The public expresses sympathy but the matter is soon forgotten by everyone except the stockman who still has to find the means from what he has left to pay his fixed charges, such as rental and taxes. When he approaches the authorities for some redress, the common reaction is his discovery that sympathy has waned. The same holds true regarding periods of low, below cost of production prices, periods of extreme drought or both in combination, as has prevailed in the immediate past.

With price and the carrying capacity taken into consideration the public is then aware that with such conditions the stockman's case is automatically taken care of without fuss or agitation. Further, when the stockman is paying rates based upon the price of the product and the carrying capacity, concerning which the public would be aware during periods of high prices or favourable climatic conditions, there could be no public clamour, as prevailed at one time in the past. On this occasion the demand was that the land should be put to a better use, or rather to a more valuable use temporarily, which would have a devastating effect upon it, resulting in an ultimate drain upon the public treasury.

Under the proposals as outlined, the public is assured that the great natural resource of grass is being put to the best possible use, that it is being conserved and that a fair and adequate rental under prevailing conditions is being received. Finally, there would be public realization that such conservation would be for the full benefit of this and future generations of the

province and for the Dominion of Canada as a whole. The public, in other words, would become a sympathetic and interested silent partner in Alberta's grazing industry.

SECURITY OF TENURE

6. As has been already outlined under the headings of Government, producer and the public under this proposed scheme, the interests of all concerned are fully protected and taken care of. In the Appraiser's opinion, the grazing rates, based upon the price and carrying capacity factors, provide the only permanency of tenure, which is so necessary for the stockman to have and enjoy if he is to plan and operate according to the latest improved methods, and to fully utilize the great natural resource of grass, which is the foundation of his important industry and the sesame to his success.

Under a flat rate per acre system, the producer may be said to be paying too little for his grazing, when his position is jeopardized by agitation to break up his land for seemingly more lucrative products; on the other hand he will be paying too much, and beyond his capacity to pay, when circumstances may force him to accumulate arrears which will again endanger his position. It has also been shown that he may have acres, possessing insufficient grass, held under a flat rate per acre system of grazing rentals, when value for the levy cannot be given. Such factors are taken care of under the scheme giving the necessary real permanency.

The Appraiser recommends the scheme for the full consideration of the producers of the short grass area, and the grazing industry of the province as a whole, as practical. It is recommended also to the Government as a decided forward step towards securing the full utilization and conservation of one of the province's great natural resources, grass.

COMMUNITY AUCTION SALES

As a departure a number of the ranchers formed the Community Auction Sales Association in 1939, holding their first auction sales throughout southern Alberta in the fall. In the main they were very successful. The average prices on cattle are shown below.

COMMUNITY AUCTION SALES ASSOCIATION IN SOUTHERN ALBERTA, 1939

The average prices received for cattle were as follows:

Choice feeder steers.....	\$6.25 to \$6.50
Medium steers	5.75 " 6.00
Common steers	5.00 " 5.25
Choice fat heifers.....	6.50 " 6.65
Medium heifers	5.00 " 5.50
Choice fat cows.....	4.75 " 4.75
Feeder cows	3.50 " 4.25
Stocker cows	4.00 " 4.50
Breedy stocker calves.....	6.00 " 6.50
Common to medium calves.....	4.50 " 5.50
Bulls	3.50 " 4.50

Average for all classes—\$5.23 per 100 lbs., or 5.23 cents per lb.

—Table by Alberta Co-operative Association, Ltd.

The sale method represented a gain to the producer over the average Calgary 1939 price of 15 cents per hundred pounds, less the cost proportionately, of the number of head put through the sale ring.

The Appraiser is of the opinion that if figures were available the spread would be wider when compared with the traditional sales, F.O.B. the ranch, less 3 per cent shrink.

Further sales are planned for this fall, and when these figures are available additional consideration can be given to this phase. For the purpose of this Report, however, the Appraiser took the Calgary average annual price as more nearly comparable to the F.O.B. ranch price.

COST OF PRODUCTION

The method of gathering data, and setting it forth for each ranch has been explained in the Preface.

The data from each ranch considering the five factors outlined by the committee, viz., capital, insurance, running expenses, annual; depreciation and amortization of the lease, over 20 year period, were transposed to the large Cost of Production Sheet, No. 1, which immediately follows, in order to give the complete picture of these ranches from the various factors involved.

- Cost Sheet No. 1 -

- Province of Alberta -

- Grazing Rates Investigation -

Short Grass Area -

Ranch

① Capital Investment -

② Insurance ③ Running Expenses

④ Depreciation -

⑤ Amortization -

⑥ A

Total

Sales

CLASS Capital-Fixed				Capital -		Livestock		Total		Total		-Feed-		Running Expenses		Depreciation		Amortization		A		Total		Sales		Per. Difference		
No.	Land	Fences	Wells	Total	Cattle No	Value	Horses No	Value	Livestock	Capital	Hay-Ton	Value	Annual	Bids	5% March	8% Fences	5% Total	Lease	5% Annual	Interest	Cost	Cap @ 3%	⑥ A	Cattle	Grain	Loss	Profit	
1 CATTLE	4450	550	2000	7000	47	1220	21	1000	2220	9220	65	195	1000	120	40	27	187	2080	52	276	1710	560	408	741				
2 CATTLE	7642	2900	8000	19062	506	20000	50	1200	21200	40262	285	600	4000	325	160	110	595	19160	479	1207	6881	4508		2373				
3 CATTLE	42948	5000	19300	67248	1900	57000	50	1500	58500	125768	1000	5444	7800	715	400	250	1365	56504.04	1412	3773	19794	48902						
4 CATTLE	18600	2800	16775	38175	377	13546	22	1100	14646	52821	350	1150	4136	393	664	140	1197	2000	160	1584	8228	2600	2530	3091				
5 CATTLE	43500	24000	90463	157963	5430	206280	250	7500	207875	395838	4100	12000	36905	2450	2317	1200	5967	240000	6000	11875	77247	56000		21747				
6 CATTLE	1800	3750	4200	9750	510	23000	150	4500	27500	37250	325	1400	3340	100	176	187	463	25000	420	1117	6746	7320						
7 CATTLE	500	1500	3450	5450	304	12400	20	1000	13400	18850	130	500	3000	60	180	75	315	13000	375	565	4755	1664		3091				
8 CATTLE	4500	400	6600	11500	30	1000	10	400	1400	12900	50	200	1290	130	320	20	470	800	20	387	2373	300	1733	639				
9 CATTLE	6320	900	3450	10670	230	8200	35	1050	9250	19920	300	2400	2400	25	236	45	306	10000	250	597	5953	3250	470	2233				
10 CATTLE	26049	1200	11300	41549	605	21925	60	3140	25365	66614	330	1925	6000	200	384	210	844	24788	619	1998	10437	7163		3274				
11 CATTLE	7000	700	12700	20400	30	1500	25	750	2250	12700	80	240	2400	135	640	37	912	1000	25	681	4258	400	3800	58				
12 CATTLE	12600	3500	9420	26520	1351	50519	20	1250	07162	75214	500	7800	6500	222	272	160	609	33000	820	2349	15134	11650		3484				
Total																												
13 Sheep	20000	3000	22000	45000	1225	10800	20	1000	12105	57160	400	2450	12000	200	800	150	1200	3300	75	1714	17139	2891	1773	12475				
14 Sheep	4480	2200	2300	12480	700	3600	40	2000	17500	23980	145	510	1700	100	420	110	330	20000	500	899	4579	2550		1687				
15 Sheep	1000	450	3750	5200	1400	3793	32	180	16403	21683	200	750	1382	100	140	24	204	4800	120	650	3221	2710		521				
Total																												
16 Horses	600	1500	2500	4600			145	7500	7500	12000	80	400	420	20	100	120	110	12000	300	503	2280	2500		210				

Short Grass Area -

29-8-40

V.E.R.

TOTAL		SALES		OPER. DIFFERENTIAL		CARRY CAPACITY		LBS. BEST VALUE BASIS		LOSSES		FEED COST	
COST		VALUE		LOSS		PROFIT		PRESENT		FUTURE		THROUGH	
CATTLE		GRAIN		LOSS		PROFIT		EX-GRASS		CALC. MKT.		OTHER	
1710 ⁰⁰	560 ⁰⁰	408 ⁶⁵	741 ¹⁰			25		42	10500	533 ⁴⁰	540 ⁰⁰		
6881 ⁸⁶	4508 ⁰⁰		2373 ⁶⁶			336		383	95750	4864 ¹⁰		397 ⁰⁰	
19794 ⁶⁴	48902 ¹²		22789 ⁶⁶	LOSS CATTLE PURCHASE	GROSS 29107 ⁵¹	7017 ⁶⁵	900	1110	277500	14097 ⁰⁰	8800 ⁰⁰	32	1592 ⁰⁰
8228 ⁷⁸	2600 ⁰⁰	2530 ⁰⁰	3098 ⁷⁹			377		350	87500	4440 ⁰⁰	200 ⁰⁰		
77747 ³⁰	56000 ⁰⁰		21747 ³⁰			5630		4200	1350100	60960 ⁰⁰	21750 ⁰⁰	30	4729 ⁰⁰
						4000		4000			6504-28		
6746 ⁰⁰	7320 ⁰⁰					374 ⁰⁰	510	500	125000	6320 ⁰⁰	20 H 800 ⁰⁰	31	1982 ⁷⁵
4755 ⁵⁰	1664 ⁰⁰		3091 ⁵⁰			300		260	65000	3302 ⁰⁰	80 N 3200 ⁰⁰	35-37	1666 ⁰⁰
2373 ⁰⁰	300 ⁰⁰	1733 ²⁰	637 ²⁵			30		16	4000	203 ²⁰		38	100 ⁰⁰
5953 ⁶⁰	3250 ⁰⁰	470 ⁰⁰	2233 ⁶⁰			230		200	50000	2540 ⁰⁰	30 H 900 ⁰⁰	31	800 ⁰⁰
10437 ¹²	7163 ⁰⁰		3274 ¹²			665		498	124500	6324 ⁰⁰	31 4840 ⁰⁰	38	1914 ⁰⁰
4258 ⁵⁰	400 ⁰⁰	3800 ⁰⁰	58 ⁵⁰			30		20	5000	254 ⁰⁰			100 ⁰⁰
15134 ⁰²	11650 ⁰⁰					3484 ⁰⁷	1351	600	162500	8250 ⁰⁰			
164220 ⁴⁷	144317 ¹⁰	8641 ⁹⁰	29049 ¹²			40283 ²³	14384	12429-2257450		114678 ⁴⁶	41030 ⁰⁰		13382 ⁵⁶
17139 ⁸⁰	2891 ⁰⁰	1773 ²⁰	12475 ¹⁰			1200		1200	60000	3048 ⁰⁰	2760 ⁰⁰	38	600 ⁰⁰
4579 ⁴⁰	2550 ⁰⁰		1687 ⁴⁰			700		1700	85000	5080 ⁰⁰	38 3460 ⁰⁰	38	2300 ⁰⁰
3221 ⁷⁴	2713 ¹⁰		521 ⁶⁴			1400		1400	70000	3556 ⁰⁰		38	450 ⁰⁰
24740 ⁷⁴	8463 ¹⁰	1773 ²⁰	14684 ¹⁴			3366		4360	230000	11684 ⁰⁰	26220 ⁰⁰		3380 ⁰⁰
2290 ⁰⁰	2500 ⁰⁰					210 ⁰⁰	145	200	60000	3048 ⁰⁰	650 ⁰⁰	38	200 ⁰⁰

In the foregoing Cost Summary Sheet, the titled lands were appraised at their fair actual value; livestock at the prevailing prices for the class and quality of stock on the ranches; wages for owner or operator, not salary, were considered; machinery, etc., at fair present appraisal value; feed in stack or bin on hand at time of Appraiser's inspection at fair actual value for kind.

Interest on capital investment taken at 3% per annum; amortization of lease, 20 years, 5% at a value of 50 cents per acre; depreciation of machinery, 8% per annum; buildings and fences, 5% per annum.

The total investment per head of cattle worked out at \$79.03, fixed capital of \$36.05 per head, with the average per head value of the cattle at \$42.98 for the cattle ranches.

Cattle represented 47.3% of the total investment, other livestock, 5.93%, making a total investment in livestock of 53.23% of total capital invested. This leaves 46.77% in fixed investments, representing a fairly healthy condition of over 50% of capital in livestock.

Of the 12 ranches investigated by the Appraiser, only three could show a profit for 1939. Nos. 3 and 4 had a profit of \$7,317.65, actually a return of capital, sale of ranch and stock less cost of restocking. The other showed a small profit. No. 9 had a \$374.00 operating profit due to a practically negligible storm loss in 1938 and a 90 per cent calf crop in 1939. The 1938 storm loss was small at a cost of nearly \$2,000 for feed, so with that considered a loss would occur. No. 21 would show a profit from the wintering of some 650 yearlings from another ranch on surplus winter feed. Disregarding that factor the 1939 operations, off grass would just break even.

All the cattle ranches which lost money on operations in 1939 can attribute such conditions to the severe weather of the 1937-38 season with the losses in stock from a late spring storm in 1938, coming after heavy feed costs. The Appraiser took shrinkage from storm on survivors into consideration in estimating storm loss values.

The three sheep ranches investigated would also show a loss from 1939 operations, largely as a result of the winter of 1937-38, including the late storm in spring of 1938. The big operating loss of Ranch No. 10 cannot, however, be attributed to sheep operations entirely as this outfit wheat farms extensively, along with its sheep operations and most of their loss was incurred in poor crop results. It is expected that the reverse will probably hold true for 1940 and that both operations will undoubtedly show a substantial profit.

The sheep ranches showed a fixed investment of 53.7 per cent—total livestock 46.3 per cent of the total investment with sheep only 28.7 per cent of same. The case of these ranches is not really representative of the industry in the area, however, as one ranch, previously mentioned, had a very large capital investment in land, which was wheat farmed, together

with a heavy investment in power machinery in that connection. A greater number of sheep ranches would, therefore, have to be investigated to get a more accurate and complete picture of the sheep industry of the area under these conditions.

The only horse ranch investigated shows a small profit for 1939, due to the small overhead of the operator who is a bachelor. During 1938, his feed expenditure and storm loss of that year showed a loss at the end of that period of about \$650.00. It is the Appraiser's opinion that this ranch will continue to operate at a loss, unless further capital expenditures are made for improved water facilities, as these horses have to go in some cases about nine miles to get to water.

The reader's attention is drawn to the difficulties which may arise from a serious prairie fire and what it can do to a ranch. This is shown in the case of sheep ranch, No. 16, with a loss, 10 years ago, of sheep and forage to the value of \$20,000.00 from which this ranch has not even yet fully recovered. Water on this ranch is also a serious problem, despite heavy expenditures for water drilling operations, which at the moment have been only partially successful.

COST SHEET NO. 2

For the reasons previously mentioned, the Appraiser has made no attempt to arrive at the cost of production per hundred pounds for sheep and horses for the area, and has, therefore, due to the time factor involved, only worked out a cost sheet for the area's cattle industry for 1939.

In this Cattle Cost of Production Sheet, No. 2, the Appraiser has endeavoured to be as practical as possible, dealing with averages throughout so far as weight, gain on grass and price is concerned.

The costs are calculated upon a 1,000 lb. cow as the unit, or 100 per cent; calves off grass at 33 1/3 per cent of unit; yearlings at 66 2/3 per cent of the unit; two year olds at 90 per cent of unit; three year old steers at 120 per cent of unit; and three year old cows at 100 per cent of unit.

Weights taken as average off grass were calves at 350 lbs.; yearlings at 650 lbs.; two year olds at 950 lbs.; three year old steers at 1,200 lbs.; three year old cows at 1,000 lbs. As there are very few four year old steers run any more in the area no calculations are submitted beyond the three year olds, except 4 year old cows.

Heifers were considered to be bred at two years, giving a stronger healthier calf, than breeding as yearlings. The Appraiser from calculations can find no advantage in breeding yearlings from the monetary standpoint, except that the initial cow cost pays out one year earlier. This is offset by loss of weight and prices of the off-spring, and according to the Appraiser's calculations, the rancher who follows such practice is only increasing his costs by such methods.

Based upon the Appraiser's investigation into the 1939 costs per animal unit, annual charges represented \$14.12, with

-Cost Sheet No. 2-
Short Grass Area
-1939-

Cost of Production - Province of Alberta -
-Cost per lb. - Calf Crop % - 1939-

Cost of Production - 1939 - Cattle			Her. Val. per Hd. Annual -	Cost - per Hd. Annual -	Total Value -	Total - \$	Cost per Calf -	Crop -	Percentage -	Costs -					
Total Investment per Hd.			19.03	CONV Limit	per Hd.	per Hd.	100% Cents per lb.	96%	80%	75%	60%	50%			
Less Fixed Chgs.			36.05	42.98											
Annual															
1. Carrying Charges Per 1000 # Cow Limit -				19.13 Birth -		Cost: -									
Plus off Grass - 33 1/2 %			v	19.13		Unit									
GAIN			v	9.32	350 #	Calf \$-Hd 18.44	18.44	5.21	5.21	5.73	6.25	6.51	7.59	7.81	
2. Yearling Steers & Heifers -				GAIN											
66 2/3 %			v	9.41	300 #	650 #	v 23.53	23.53	3.62	3.62	3.98	4.35	4.50	5.06	5.43
3. 2 yr. Old - Steers & Heifers -															
90 %			v	12.71	300 #	950 #	36.28	36.28	3.81	3.81	4.19	4.57	4.76	5.48	5.71
4. 3 yr. Old - Steers -															
120 %			v	16.76	250 #	1200 #	v 53.30	53.30	4.93	4.93	4.87	5.32	5.54	6.19	6.64
5. 3 yr. Old - Cows -															
100 %			v	14.13	-	1000 #	v 50.36	50.36	3.19	3.19	3.50	3.83	3.98	4.43	4.68
6. 4 yr Old - Cows -															
120 %			v	16.76	200 #	1200 #	\$Hd 67.32	67.32	2.10	2.10	2.31	2.52	2.63	2.94	3.13
Basis. Heifers bred @ 2 yrs															
Cattle carry load.															
Other live stock.															
Interest on Borrowed.															
Capital - Not Included:															
If borrowed @ 6% Interest.															
1000 # unit add. \$1.00 or															
1/10 Cent per lb. - 1939 Average															
Total Average Cost: 7.5 units (7500 #)															
Total															
Price 1939 - Calgary Average															
Differential over Cost 1939 per 100 #															

6/9/40
C.G.A.

6/9/40
 C.D.A.

a 100 per cent calf crop. This represents also calf cost at birth, cost of calf at weaning or off grass, same plus carrying charge of \$4.32, making a total of \$18.44.

With an average 75 per cent calf crop, such calf would cost the stock grower \$21.79 to produce or, in other words, he would have to sell at \$6.51 per 100 lbs.

The Appraiser, with reference to the Cost Sheet, has submitted a table showing the cost per lb. for each class of cattle, as well as the total price per head, for each that the producer would have to receive for such to return his cost of production in the short grass area in 1939 with a 75 per cent calf crop.

Class	1939	75% Calf Crop	100 lbs.	Head
Calf	Off Grass	Average 350 lbs.	\$6.51	\$21.79
Yearlings	" "	" 650 lbs.	4.53	29.45
Two Year Olds.....	" "	" 950 lbs.	4.76	45.22
Three Year Steers.....	" "	" 1,200 lbs.	5.54	66.48
Three Year Cows	" "	" 1,000 lbs.	3.98	39.80
Four Year Cows.....	" "	" 1,200 lbs.	2.65	31.80

The Appraiser has found from his calculations that the short grass producer, from his cost of production, must have received, with a 75 per cent calf crop, an average price of \$4.63 per 100 lbs. for all classes to meet his cost of production.

If he had no serious storm loss in 1938, then, based upon the 1939 average Calgary market price for all classes including calves, which was \$5.08 per 100 lbs., he had an operating differential over cost of 45 cents per 100 lbs., F.O.B. ranch, shrinkage of usually 3 per cent not considered.

In the table submitted, the Appraiser has shown what the rancher's costs would be for each class per 100 lbs. at 100, 90, 80, 75, 60 and 50 per cent calf crops, so that he can easily estimate his costs, depending upon his calf crop percentage. Higher percentage means lowered costs, lower percentage means higher costs. The same applies to the man who had higher gains for 1939 in weights than the Appraiser has calculated. He had a lower cost, while the man with poorer weights than taken as an average, had increased costs.

In these calculations the cattle on ranches were presumed to carry the load of other livestock on such, as the raising of cattle was the primary purpose of these industries.

The cost of the initial cow on the ranch in 1939, with a 75 per cent calf crop, was found to be \$39.80 per head.

Interest on borrowed capital for current operations was not included in these calculations, but if interest on such borrowings amounted to a rate of six per cent per annum, an addition of \$1.00 per unit would have to be added, or 1/10th cent per lb., to the cost.

If the operator was attempting to earn six per cent per annum on his capital investment, instead of the three per cent as

calculated and suggested by the Short Grass Committee, this would add approximately 50 cents per unit, or 1/20th of a cent per pound, to the calculated costs.

This would bring the total cost per 100 lbs. on the ranches of the short grass area of Alberta in 1939 to \$4.78.

If a charge for management were made, this would amount to approximately \$1.00 per unit additional cost, which would add 1/10th of a cent per lb., bringing it to \$4.88 per 100 lbs.

It can be seen, therefore, that under these circumstances the rancher in the short grass area, taken on the average of the Appraiser's findings in 1939, just realized slightly better than the cost of production on his cattle if he had had no 1938 storm loss, or heavy feed expenditure, to overcome from that year.

From the findings, the Appraiser is of the opinion that the operator on a cow and calf basis, or who marketed yearlings or two year olds with good weights in 1939, showed the most profit in his operations, as his costs were less.

After completing these cost sheets, the Appraiser interviewed several successful cattle ranch operators of the short grass area, not included in the survey, and they expressed the opinion that such costs closely approximated their own calculations upon last year's operations.

The Appraiser submits, therefore, this table of 1939 costs, to the Department and to the Short Grass Stock Growers' Association as a fairly accurate picture of the condition of the cattle ranching industry in Alberta's short grass area during last year. Such a table is submitted in the hope that it may be of value to the individual cattleman of the area as a basis in arriving at his costs for the year, so that he may quickly determine where the leaks in his business have occurred or are occurring.

The table can be used also as a basis, should it be decided to estimate the rates on the cost of production factor, rather than a grazing rate arranged upon percentage of total value of the forage produced in any one year.

The year 1939 can be taken as a fairly good base because, over a large portion of the area, the grass growth during that period was good and most of the more palatable species of native forage produced seed, following a rather severe winter and the late spring storm of 1938. The summer was hot and dry with high winds and high evaporation conditions.

The year 1940 showed good forage growth from favourable growing conditions with an abundance of winter feed being produced over the area, and although high temperatures prevailed, with high evaporation, this has been offset over the majority of the area by timely summer precipitation. Since the 1938 storm, greater attention has been given to the feed problem by stockmen, so that the severe losses which occurred then are not as likely to occur in the future. One rancher remarked to the Appraiser, "I have come to the conclusion that I have helped to make some of the hard winters that have occurred."

This may possibly be true as it is axiomatic that the carrying capacity of any ranch is set by the least of its seasonal ranges, which has perhaps been overlooked to some extent in the past. The present general market trend appears to be higher than in 1939, so that some profit is promised for 1940, though labour costs will likely show some increase.

GRAZING POLICY

Is there any real necessity for us to consider a permanent grazing policy for the short grass areas of Alberta, or if necessary, and in the broader aspect, for the interior of the American Continent?

Just consider for a moment the following picture of what this great interior plain presented years ago:

*Just glimpse at this country seventy years ago; a stretch of low grass covered hills, blackened as far as the eye could reach with huge, shaggy, humpbacked beasts, bellowing, fighting and pawing the earth until it trembled under the millions of hooves. A buffalo herd on the move.

It is almost impossible for us today to realize the number of animals these herds sometimes contained. Listen to a report made to the United States National Museum by a settler passing through the buffalo country: 'The whole landscape appeared to be one mass of buffalo moving slowly to the north, and it was only when actually among them that it could be ascertained that the apparently solid mass was an agglomeration of innumerable small herds of from fifty to two hundred animals, each definitely separated from the others.

From the top of a rocky ledge I could see from six to ten miles in almost every direction. This whole space was covered with buffalo, looking from the distance like a compact mass.' From careful information it was estimated that such a herd would comprise at least 4,000,000 animals.

Up and down this grass belt these countless herds roamed for ages; not aimlessly for there was a definite plan—Nature's plan, given in some way to the buffalo. In terms of today it was simply a system of deferred grazing.

Imagine the effect upon the grass of a continuous herd of buffalo twenty-five miles long, as was not unusual then. First it was grazed off closely then trampled under the millions of pounding hooves. Seemingly the grass could not recover from such a terrific grilling.

But slowly, as the months went by, it came back.

The buffalo did not return the next year; sometimes if conditions were unfavourable, they did not return for two years. When they did come back the grass was fully restored and the cycle was repeated. But the buffalo passed from the Western horizon. Perhaps it had no place in the new scheme of things, but its manner of passing is one of the greatest tragedies of our history—slaughtered out of sheer wantonness, until in the seventies, it disappeared from the plains.

This can be said of the first ruler of the range. It grazed the plains of the middle west for unrecorded years and left them as it had found them—a perfect carpet of grass.

*"The Buffalo Taught Us," Country Gentleman, July 7th, 1923—Drought Scrap Book, C. G. Anderson.

In recent years grass has taken on a new importance. As Dean Davenport pointed out in a recent issue of the 'Country Gentleman,' the relative rise of meat and other animal products in the agriculture of the United States, means that grass, along with corn, will dominate agriculture throughout the great bread basket of the nation; and the sooner that is recognized the better.

We can learn a lot from the methods of the buffalo in the handling of grass, and through it Nature's wonderful restorative powers for a mutilated and scarred surface. Is there any good and valid reason why our road sides should be filled with weeds, instead of grass? Weeds are Nature's way of covering the scars made on her face. Why not require the Department of Public Works and Municipalities to seed new road construction ditches with grass, instead of leaving weed infestation as at present. The Japanese recognize its importance on the shoulders of new grades on their roads and railways in Manchukuo to cut wind and water erosion.

This would be a type of conservation which would pay large dividends in the long run.

In order to arrive at a proper grazing policy, it has been necessary to review some of the past history and problems of the short grass area, so that such can be formulated. Therefore some general conceptions, as found from United States experience due to the magnitude of their problem, are quoted below to give clearer understanding.

"Arid grazing lands" are those where yearlong or seasonal grazing is assured, but where any kind of cultivation of crops is possible only a small part of the time or not at all, and upon only a very small part of the area. The average annual rainfall of this area ranges from about 6 to 15 inches.

Where the average annual rainfall is from 15 to 20 inches, cultivation of certain crops is often possible when topography, soil conditions, and the seasonal distribution of rainfall are favourable and the growing season is long enough; but the farm practices are those of the system called 'dry farming' and the land is here called 'semi-arid' or 'dry-farming' land.

Of course, these subdivisions are more or less arbitrary, but they are necessary in order that we may consider the best utilization of the different regions with some degree of accuracy.

These areas of variable productivity cause much trouble when an attempt is made to show upon the map the boundaries of each kind of land, because the boundary is a zone and not a line. These transition areas will not continuously produce when operated under the more complex type of organization to which they are occasionally adapted; hence they must be operated all the time under a lower, but safe type, and the system of management made flexible enough to accommodate itself to the periods of more than the assured production.

The determining natural conditions are not the average climatic conditions. They are the absolute minima, and the relative frequency with which these minima may be expected to occur. We do not need to be told that citrus fruits cannot be grown with profit in a region where the temperature goes to zero for a longer or shorter time one year in five, no matter what it may do the other four years; but it seems to be necessary to demonstrate by trial and failure that crop farming cannot be made to support families on land where period of drought last-

ing one, two, three, and even four or five seasons in succession are known to occur with more or less regularity—periods of drought so severe that no known cultivated plants can be expected to endure them and produce a crop.

It is believed that much of the great plains region in eastern Montana and Wyoming, shown here as dominantly dry-farming land, will ultimately prove to be arid grazing land.

CLASSIFICATION OF LAND IN THE 11 WESTERN STATES

Class of land	Acres	Per cent
Humid crop land.....	20,000,000	2.67
Irrigable crop land.....	41,000,000	5.47
Semi-arid crop land.....	260,000,000	34.71
Arid grazing land.....	260,000,000	34.71
Forest and woodland.....	128,000,000	17.09
Desert land	40,000,000	5.35
Total	749,000,000	100.00

Since nearly all of the forest and woodland is operated as grazing land, it follows that over half of the area of the 11 Western States is used as arid grazing land and must continue to be so used.

Rarely less than 7 to 10 acres and often more than 50 acres are required to support a mature cow or equivalent live stock, for a year. For the south-western states (not including the desert area) the average is approximately 30 acres per cow.

This region receives relatively little precipitation. There are a large number of clear days during the year and ordinarily a very dry atmosphere. The plants are subjected to strong light, high daily temperatures, sudden and large changes in temperature, and a wide annual range of temperature, as well as a limited supply of moisture. The different adjustments of these factors of moisture, heat, and light, modified to a greater or less degree by the soil and topography, determining the area over which each kind of plant may grow. The combination of plants growing over an area forms the plant association for that area, and the plant association determines in a broad way the grazing capacity for live stock.

The introduction of grazing animals on any plant association also tends at once to change the relationships existing among the different plants of the association, because the animals do not graze equally all the plants of the association. They always select the plants they like best and eat them first. Thus there is a strong tendency for the plant that is the most palatable feed on the range to be exterminated by the animals. Especially is this the case if the range is too heavily stocked.

HOMESTEAD LAWS

Notwithstanding what must be said against the working out of the policy which these laws represent, two minor advantageous results must be recognized. Legal tenure to the land is ultimately obtained locally, generally after much waste of labour and wealth; and the forage plants have an opportunity to recover from the effects of previous overstocking. The 320-acre law did help out some men who took up dry farming land under the 160-acre law and were able to live on it, as did those under the Kinkaid Act in Nebraska. The grazing homestead act will help an occasional man to consolidate other holdings and make a productive stock ranch.

Nor is this all. The consequences to the State and to the nation are, (1) a much lower total production from the whole area, (2) a much lower standard of business organization than is easily possible and highly desirable, (3) a continually diminishing productivity of the lands, and (4) an increasing precariousness in the business, to say nothing of lost taxation and lack of social progress.

In no case should sub-division into areas of less size than the economic holding be permitted in an attempt to improve upon the existing adjustment. This principle is illustrated in the Texas leasing system, which recognizes a limit to which the leasehold of a large holder may be reduced by incoming lessees or purchasers.

Fundamental to the making of any law is the realization that in operation the proposed law must start with the present status of the business and take that next step in development which leads toward the ultimately desirable. The present adjustment works, in a way; the proposed adjustment must work better or there is no advantage in changing. It is not possible to clean the slate and start the problem over again, but it is possible to make changes in rules of procedure which will ultimately change the whole business for the better, with less injustice to anyone than results from the present procedure.

REQUIREMENTS THAT MUST BE MET

Legislation for the improvement of conditions must recognize the equities of the present users, which should be considered not only from the standpoint of justice to the men who possess them but from the more important one of the best utilization of the land.

It is of the utmost importance that controlling officials who might be charged with supervision of the Government grazing lands should have the power to say how many animals may be put upon a given area of land, for upon this power rests the whole plan of building up the ranges.

The only existing 'right' which should be curtailed is that of the unregulated use of the public domain.

Gradual enlargement of the homestead area.—Underlying the original homestead law and all modifications of it since passed, is the assumption that the entryman is to receive as a gift from the Nation, an area of land which, if properly worked, will furnish him and his family a reasonable living. In the humid region 160 acres of farming land was rightly judged to be amply sufficient. The law was made when everybody considered the areas here referred to as semi-arid and arid grazing land, to be a part of the 'Great American Desert', and few expected that it would ever be used for any kind of agricultural purpose. At that very time, however, there was growing up the industry which led the way to the occupation and use of these lands—the range grazing of stock.

Some men made failures on land taken under the 160 acre law because the land was dry-farming land, and they didn't have enough of it. Those who obtained a proper-sized area and learned dry-farming practices demonstrated the possibility of utilizing the land in this manner. The reason for the failure of some was not properly appreciated, hence little surprise was felt when men failed to farm a large part of the land that was taken up under the 320-acre act. The losses of these homesteaders were accepted as proof of their ignorance of dry-farming practice, while in reality they failed because they did not have

enough land to carry on a profitable type of agriculture. Likewise, the disruption of the grazing business which occupied this land before the homesteaders came, and the fact that after a period of adjustment a relatively large part of the land went back to its original use as grazing land, have also not been properly recognized.

Millions of acres have been taken that, though they will produce certain crops (mostly forage) during favourable years, will not produce these crops during the years of drought which occur at more or less regular intervals. The area of land plowed for crops on a grazing homestead reduces the grazing area of the farm by just so much, and therefore reduces the number of animals that may be carried on the grazing land alone. Yet these animals must furnish the income for the years of crop failure.

The statement is often made—and believed by many—that the introduction of crop farming into a region increases the rainfall of the region, or, as it is ordinarily worded, “the rain follows the plow.” The records of the U.S. Weather Bureau demonstrate beyond question that this is not true. Plowing the land frequently does diminish the run-off, thereby improving the utilization of the water that falls, but when the total amount of water that falls is too small for the production of the crop, plowed land will produce nothing at all or but a scanty growth of weeds. Normally such land, if it has not been plowed, will produce a growth of native grasses or shrubs even during the dry seasons to which it is frequently subjected, but when the land is plowed these plants are destroyed and it takes many years for them to reoccupy the soil after cultivation has ceased. It therefore is clear that when an entryman attempts to cultivate land whose productivity is so problematical, he is taking a very large risk of losing everything he puts into the venture.

Probably the surest way of determining whether or not some of this land will produce crops profitably is to try it. Large areas of it certainly will not. Other areas will, part or all of the time. These areas that will and will not produce crops are often in close juxtaposition. Such lands, because of their relation to each other, are best used together.

This condition has arisen in place after place simply because men have improperly estimated the agricultural possibilities of the land. In the present state of our knowledge there is but one criterion by which to judge. Arid and semi-arid lands should be recognized as grazing lands and treated as such until it is demonstrated that sufficient crops either of forage or of grain can be grown upon selected areas during the dry years to guarantee, in conjunction with the associated grazing land, a living to the occupant.

GOVERNMENT LEASE SYSTEMS

Government leasing system.—A government system of leasing is today in operation on grazing lands in Australia, New Zealand, Texas, some on certain lands of other States. Various justifiable criticisms of it have been made, but in operation it produces much better results than the open-range system now compulsory on our arid grazing lands. It authorizes individual control of the land for a considerable period, and by so doing encourages the stockmen to use their best skill in its management. This is the most important result of any system of control and the main thing sought. To that extent the leasing system is to be commended.

There are two serious objections to the method, though they are not insurmountable. Existing custom with respect to land leases assumes that the lease transfers the land to the lessee for his individual use for a given period of time, and leaves the character of the use to his judgment. The price paid for the use of the land is ordinarily expressed as so much per acre. Consequently there follows a tendency to overstock, particularly toward the end of the term of the lease, and to a continual squabble over the price. To avoid these difficulties, it would be necessary to include in the lease a statement of the number of animals that might be put upon the land, retaining the privilege of counting them at any time. And this number of animals and the price per acre or section should be based upon the grazing capacity of the land, making the charge constant for an animal unit. However, when these conditions are written into the lease, two of the main features of the permit system have been introduced.

The second serious difficulty lies in the fact that the kind of law that will suit the conditions in one region will not do at all in another place; and so far no one has been able to devise a lease law that would cover all the necessary provisos and exceptions and properly localize the application of such limitations. Because there has been no way of getting the men most affected by such a law to agree on a form of law that all would be willing to support, the opponents of any and every sort of change in the *status quo* are able to argue that these would-be improvers cannot agree and are squabbling among themselves for personal advantage instead of seeking a general improvement in range management such as they profess to be doing.

PERMIT SYSTEMS

Adaptation of the permit system.—The permit system of control of the grazing lands would often differ very little from a leasing system, but it has several advantages over that system, not the least of which is its flexibility. The essential difference between them is that under the permit system a man receives a permit to graze a definite number of animals for a definite period of time on certain specified lands, with priority right to consideration for renewal at a future time, while under the other system a man gets the use of a definite number of selected areas of land for a definite period, usually also with priority considerations for renewal. The one plan determines the number of animals and the authorities take the responsibility of estimating the amount of land necessary to care for them. In the second case the user leases a specified piece of land and adjusts his stock to the feed produced thereon. At first sight there is no difference in the effect, but there are really two factors that are vitally important and over which sincere differences of opinion may arise and cause arguments in which differences of interest would interfere with correct judgment.

The amount of feed required for a given kind of animal differs very little, hence a uniform charge per animal is fair to all and is easily applied; but a uniform charge for forage per acre of land is not at all equitable because the forage produced by different acres is often very different both in quality and in quantity. Adjustment of stock to area by the permit system normally results in slight understocking of the range, if any mistake is made; while the lessee of an area is almost sure to overstock in order to be sure that he "gets his rent back." Especially is this true if his tenure of the land is for a short period only. Likewise is this true of a poorly-informed man who makes short-sighted plans. And it is very difficult to

prove that he is really overstocking the range, until it shows deterioration, and then the harm has been done. For these reasons it is wiser to handle the range under permit.

Under certain conditions it is highly desirable to handle the grazing of a given area as a community pasture. This is particularly true in the vicinity of little towns where the owners of land adjacent to the grazing lands each have a few head of stock that need pasture. The permit system is easily adapted to such conditions, while a leasing system is difficult to adjust.

Where scattered bodies of land too small for separate use belonging to one owner are mixed with similar scattered areas belonging to one or more owners, it is often advisable to use the land as a community pasture. Such an adjustment may be brought about by pooling the use and adjusting charges on the basis of the number of animals grazed and prorating expenses on the basis of tenure. If a part of the land is still Government land it might be leased to the owners, either separately or as a group, leaving them to determine its use and prorate the fees. The same result can be obtained by granting a permit for the grazing of a certain number of animals upon the land, but this method automatically regulates the rate of stocking to the grazing capacity of the land.

UNITED STATES FOREST SERVICE USE BOOK

(18) For those who are not acquainted with the principal features of the system as applied, the following note is appended (the details of the rulings may be found in the latest Use Book, issued by the Forest Service):

The method of handling the National Forest ranges for the grazing of live stock is based upon the permit, rather than the acreage system, as being more flexible and satisfactory. Permits are issued upon applications which give full information as to the owner's status as a stockman. He must own the stock absolutely in his own name. He must own land on which forage is produced for the feeding of the animals under permit, when off the forest ranges. Leased lands are not considered as a basis for a permit. Permits are issued for periods of from one to five years and are not transferable. If a permittee desires to sell his stock and the lands connected with their use, the purchaser can obtain from the seller a waiver to the United States of his grazing preference, which entitles the purchaser to a renewal of the permit for the rest of the grazing season. If the purchaser is properly qualified a permit will be issued to him personally the next season. The signer of a waiver cannot again obtain a permit for a period of three years unless there is surplus range not needed by other applicants. With each permit sufficient range is allotted to graze the number of animals allowed.

With cattle, the ranges are generally used in common. With sheep, each permittee receives a definite allotment upon which his sheep must be held. Cattle, not being under control of herders, cannot be kept closely upon their allotted ranges, but, as far as possible, this is required by the terms of the permit.

If owners have ranges on the public domain adjoining the forests and their stock cannot well be restrained from finding their way upon the forests, 'on and off' permits are issued which cover the whole number of animals that may, at any one time, be upon the forest, but payment is required for only the average number that graze.

Drift fences are allowed at points where they seem advisable in order to restrain cattle from drifting away from their

proper ranges. Pastures of reasonable size are granted permittees for the purpose of holding steers and stock for sale, holding saddle and work horses, and for use in breeding and weaning. Drift fences are not charged for, but individual pastures are, the charge being by the acre and based upon the value of the lands for such uses.

To prevent monopoly of the ranges, certain maximum limits are established for each forest above which no individual firm or corporation may receive a permit. Protective limits are also established below which no permit will be reduced to make room for new men.

It should thus be clear that while the permit system is perhaps the best single system that has so far been devised for the management of these arid grazing lands, not the least of its advantages is that it does not necessarily interfere with the application of the homestead policy, the consolidation plan, or a lease law in the regions where these methods are desirable.

It is not intended to suggest or assume that a permit system is flawless. It has certain well-known disadvantages. Not the least important of these is the necessity of a complex supervisory authority. In operation, more or less friction between officials and permittees will occur because of differences of judgment as to the use of the lands. This difficulty can only be minimized, not obviated. Organization of the stockmen and the creation of advisory boards for consultation with the administrative authorities have gone far toward reducing such friction in the National Forests.

In administering the permit system in the National Forests it was found necessary, for a long time, to issue annual permits to stockmen in order that the necessary adjustments of numbers of animals to available feed might be made each year, and the greatest number of permittees be thus accommodated. Not until after the stock business of a region becomes tolerably well stabilized and the use holdings definitely located, is it possible to lengthen the period for which permit is issued. Even then the long-term permit must be hedged about by various restrictions and limitations that make it look like a doubtful asset to the permittee.

These necessary limitations of the system usually cause permittees to delay construction of all permanent improvements because they are not certain that they will profit by such improvements enough to warrant the expenses involved. A policy of Absorption by the Government of the property rights in such permanent improvements also causes the permittees to avoid or delay making such improvements. This policy doubtless is derived from the custom of assuming that all permanent improvements necessarily belong to the owner of the land upon which they may be made.

These difficulties, however, are not insurmountable. An annual permit becomes the equivalent of a long-term permit if it may be renewed each year for an indefinite period. Restrictions that limit one to the best kind of use are restrictions in name only, even if they do appear quite portentous when written into a contract. Nor is it necessary that improvements put upon should thereafter be permanently attached to the land. Many forms of lease give the tenant right to remove improvements made by himself from the land of his landlord. In certain of the Australian colonies, improvements are recognized as belonging to the lessee, and when made on Crown lands the improvements may be removed, sold to the next tenant, or under

certain conditions the colonial government itself buys the improvements at reasonable valuation.

As has been said, where a lease would apply best the long-period permit is not essentially different from a restricted lease. The permit system places supervisory powers in the hands of officials, who thereby become responsible for the proper conservation and development of the lands, and makes necessary the selection of men who have this broad outlook. Its administration keeps them constantly in close touch with users of the land. The possibility of ready adaption to various conditions is one of the greatest advantages of the system.*

The writer of the foregoing is rated as one of the best authorities on land utilization of western lands in the federal service of the United States.

GRAZING POLICY—CONSERVATION

A practical, hard-headed stockman of the short grass area has this to say on the question of land policy, and he is speaking not only as a rancher but a responsible citizen of Western Canada, who has devoted much thought to the question. He states as follows:

As we shape the policies of Western Canada it would seem necessary to consider from every angle the best use that could be made of the different parts, always bearing in mind what natural law will allow us to do. It has been pretty well proven and I believe is being recognized that there is a grazing area in Western Canada which will not grow grain successfully. When that is admitted then the question arises, 'What are we going to do with the land?' We cannot afford to have large tracts of land lying idle. Some of this land has been settled three times by different groups of people over a thirty-five year period, and is now standing idle. This would seem to bear out the statement that cactus, sagebrush and wheat do not thrive under the same conditions.

To use and get revenue from this grazing area there seem to be certain rules and practices which it is necessary to follow. When mapping out such a policy it must be borne in mind that this kind of country will support a limited population quite well at occupations that it favours, made up of people who have learned by experience to live in it; but it will not support a large population at all. Until 1908 the above conditions prevailed, the grass being used at very small cost by people who understood the country and carried their own grief. Since that time the method of using grass has changed a great deal, the overhead having been increased by fixed charges and expenses of one sort or other to a point where the revenue is not sufficient to carry the load in many cases.

Data has already been gathered and is available for use to build up a policy and set of regulations under which this range area could be developed to the extent where it would insure a comfortable living for a certain percentage of our population. This would change the status of a vast tract of land from a public liability to an asset which would in turn lessen the load of other more favourably located parts of the Dominion.

*U.S.D.A. Bulletin, No. 1001: "The Relation of Land Tenure to the Use of the Arid Grazing Lands of the Southwestern States," E. O. Wooton, Assistant Agricultural Economist.

We have not settled down to any policy in the last twenty years. Progress and stability could not be expected under an administration of this kind. It would seem necessary to put together a sound and lasting policy of some sort if we are going to interest people who have energy and ambition enough to help themselves; such people, generally want to know what they may expect before starting upon a project of any kind.

I don't believe it is a case of trying to find out what the difficulty is, so much as it is trying to right some of the things that have already been proven to be wrong.*

There is much wisdom expressed in the above quotation, and the solution calls for the co-operation and the best efforts of not only the citizens of the area and the Government officials concerned but the best ability, also, of the general public at large.

The question of soil conservation and rehabilitation of the marginal lands of the province, of which the large majority lie within the short grass area, and which enter into the stockmen's cost of production picture, is a large one. It is beyond the scope of this investigation to go into all phases of the question except in a broad way, to point out what must be done, and how it can be done. The Appraiser can do no better, therefore, than to quote a recognized authority on the subject.

MARGINAL LANDS

The problem is no doubt made harder by the fact that much land, in certain districts, has been broken, that in the light of experience would have been better left in the natural state. Much of this was broken during periods of ample precipitation and when prices for wheat were relatively high. It is frequently referred to as marginal land, either from the fact that it is situated in a district known to have a limited rainfall or else the land itself is of such poor quality that it cannot be depended upon to support an agricultural population.

Some would have us believe that there are huge blocks of these marginal lands. Probably there are. However, the term, after all, is only relative and it will require very careful soil and economic surveys to determine accurately and justly the areas that may properly be classified as such. The lands so classified must eventually be taken out of cultivation, be seeded to grass and returned to the control of the Crown to be leased for grazing purposes.

The suggestion that these areas be made into forest reserves and that the unemployed be put to work to set out whole forests of trees on them is futile and doomed to failure. I have no objection to having unemployed persons used to perform some useful work; for instance, if they had been kept planting trees during the last four years in parts of Canada where forests will grow, the result would have been of great value and of national importance to Canada, but to utilize them for work of this kind, in practically the only part of Canada outside of the barren lands where forests cannot be grown successfully, is the height of folly.

By this time you may have gathered that I am not particularly enthusiastic about many of the schemes that have been

*R. P. Gilchrist, Wild Horse, Alberta: "Canadian Cattleman," March, 1940.

advanced as cures or remedies for what is known as the drought problem in Western Canada. Not that I question the sincerity of those who have proposed them, just the reverse—I admire them for their enthusiasm and for the interest they are taking in connection with finding a solution to what admittedly is a serious question of national importance. Rather, I cannot endorse them for the simple reason that I have so far been unable to find sufficient evidence of a scientific or practical nature to support them. In fact, I am not convinced that the premises upon which they are based are sound and, if not, they cannot possibly be made to succeed.

NO SPECTACULAR CURE

I have endeavoured to make it clear that the fundamental factor in connection with drought and all its attendant evils is long continued lack of adequate precipitation for the successful growth of farm crops. There is no spectacular cure for a condition of this kind. It is not by any means hopeless, however. Rehabilitation will come slowly. Readjustments are even now taking place and, with the return of normal precipitation to the area affected, and it will return again, much more rapid progress will be made. The most permanent and lasting improvement may be expected to come from the farmers learning how to better adapt their methods of farming and mode of life to the natural environmental conditions by which they are surrounded. This adaptation will take many forms, new methods of tillage will be evolved; drought resistant crops utilized to a greater extent; certain practices will be changed in order to control insect pests. Both epidemic and endemic types; the importance of both plant and animal diseases will become more generally recognized; new and more dependable crop rotations will be gradually developed; in certain areas farms will become smaller; in others, they will increase in size; some land will be abandoned; more land may be set aside by the state and reseeded to be used for grazing purposes; more attention will be paid to ensuring good gardens by planting of windbreaks; to the supply of water for stock and for household purposes by means of collecting snow water in dug-outs; to holding more snow on the fields by means of crop residues and otherwise; to the use of fertilizers on a much wider scale; and quite possibly to the greater use of such hardy plants as the Russian thistle as a food for stock. The farmer in these areas will have to definitely limit his livestock activities. Much hardship has been caused in the past by overstocking. All areas subject to drought or crop failures are particularly vulnerable when large numbers of livestock are kept on the farms. He will also learn to carry a reserve supply of feed. Both roughage and grains, to assist in tiding him over the dry, lean years that are likely to return.

How then can assistance be best rendered? Because the problem is of national importance involving the livelihood of thousands of farm families, and menacing the very existence of certain towns and villages located in the distressed area, it is probably too heavy a burden for any one province to shoulder.

JOINT ACTION NECESSARY

It would appear that joint action is necessary, that the best brains available be utilized in the effort. It may well be that the initiative should be taken by the federal government; certainly financial assistance must come from that source. How the board or commission or committee be set up is of less

importance than its personnel. It is important that those empowered to make plans for a recovery program for the drought areas of Western Canada be men of sound scientific training with some practical knowledge of the many problems involved. The complete co-operation of all departments of government both federal and provincial as well as the prairie universities and the National Research Council is essential to the successful completion of a satisfactory program.

If the plan as finally put forward by the investigational body is accepted, what agency should be charged with putting it into effect? Obviously either the federal or provincial government must take the responsibility. If the former, we immediately accept the principle of remote control which experience has shown to have many weaknesses especially in connection with agricultural problems. In my judgment, the responsibility of putting into effect any plans that may finally be accepted rests squarely with the provincial governments. My reason for this belief is because the various departments are already responsible for this area, and are in very much closer contact with the many problems involved than any other group can possibly be. Every department of government is interested, e.g., Agriculture—in connection with revising methods of agriculture; Municipal Affairs—in connection with revamping municipal units and problems of taxation; Legal and financial departments—in connection with indebtedness and credit arrangements; Lands and Natural Resources—in connection with condemnation and later administration of lands during transition periods; the Service Departments of Public Works, Highways, Telephones and Education will all be responsible for the actual administration of these varied services. They already are charged with this responsibility. Why remove it and place it on someone else? It is not quite clear to me just what an administrative board in a matter of this kind could do that a provincial government could not do infinitely better.

It may be, however, that a properly constituted board could be of great service in connection with securing and correlating all available information dealing with the problems, but as far as implementing said plans, it would seem that they would be forced by the very nature of the work involved to fall back on the various departments of the provincial governments. Regardless of when or how the boards are appointed, or by whom, and regardless of what plan or plans they may bring forward, progress will be slow.

There are many details in connection with the rehabilitation of the farms of the drought area and other aspects of reclamation activities that time does not permit me to deal with in this address. An attempt has been made, however, to analyze to some extent some of the proposals that have for several years been kept prominently before the public as well as to draw attention to some of the fundamentals that perhaps have to some extent been overlooked.

In these times, large-scale plans of grandiose and extremely costly design are being offered and adopted in many lines of human activity. To date, however, there is little evidence to indicate that they have been entirely successful. In many instances, they have completely failed to accomplish what was intended. In most cases, the difficulties encountered resulted from failure to give sufficient consideration to the fundamental factors directly bearing upon the economic soundness of the scheme.

CAREFUL STUDY NEEDED

Any and all schemes that may be put forward in connection with the rehabilitation of the drought area must not be accepted offhand at their face value, but must be subjected to the most careful scrutiny if we are to avoid mistakes that may well prove to be extremely costly.

It will be a long-time undertaking requiring infinite patience, sound judgment and clear vision on the part of those in charge, but the effort will be well worth while.

The territory involved is a vast one comprising many millions of acres of fertile prairie land, the productivity of which being definitely circumscribed by the climatic conditions that obtain. These conditions are the fundamental factors that do now and will always continue to determine the types of agriculture that may be successfully practiced on these plains. At times they may be favourable; at others, harsh and cruel, but they cannot be ignored and success will depend upon how skilful the prairie farmer may become in fitting his types and methods of agriculture to the rather variable but nevertheless rigid climatic conditions that surround him. In this he will need help, much help, and he is worthy of the best Canada can give him in this respect.*

ALBERTA GRASS CONSERVATION COMMISSION SET-UP—PERSONNEL

Dean Shaw has shown in his address, just quoted, some of the fundamentals which must be adhered to, if the problem of rehabilitation, conservation and proper utilization of these lands is to be attempted and carried to a successful conclusion over a long term of years.

In this Report, the Appraiser has shown what the Province of Saskatchewan is attempting to do by means of their Land Utilization Board and the Prairie Farm Rehabilitation Act of the Dominion in this problem on their lands in the short grass area. The set-up, also, has been shown of the Montana Grass Conservation Commission and what it has started to attempt to accomplish.

In Alberta, we have several agencies, attempting to deal with the problem in different phases and spheres of influence. The Department of Lands and Mines has to deal with the land problem, the Special Areas Board is handling problems of rehabilitation of settlers in those special districts and community pastures in those areas with grazing rates adaptable to these localities, arranged by the Department of Lands and Mines.

The Department of Municipal Affairs is concerned with the title of lands taken over by the province as a result of tax recovery proceedings in the short grass area and elsewhere in the province where sub-marginal lands obtain.

Municipalities, where existent, also own and control some lands in the short grass area, and, in some cases, the Department of Lands and Mines has land leased at certain rates, the municipalities have others alongside at different rates, generally higher,

*"Drought on the Canadian Prairies," an Address by A. M. Shaw, Dean of Agriculture, University of Saskatchewan.

to complete the checkerboard pattern; while the Department of Municipal Affairs, which is naturally anxious to recover taxes, may sell or lease some lands for cultivation, that should never be retouched with the plow, and which may spoil nature's healing process of fifteen or twenty years. This latter is especially true if what appears to be a favourable moisture year is in sight, and individuals become willing to break up abandoned lands for the immediate thought of profit without regard to the general picture or its effect upon the work of Government agencies, or the welfare or purse of the general public.

The Department of Agriculture is concerned in the weed problem arising from these lands, the grasshopper menace and other pests resulting from abandoned lands; and their problem and costs is further aggravated by each set-back as a result of one or two good years; which have been shown to be few and far between in the short grass area. The relief seed and feed problems and costs are the aftermath of lean years and demonstrate the lack of a comprehensive long range policy with regard to these lands.

The necessity of a real conservation policy, therefore, for these lands has been shown to be imperative, if the problem is to be solved; and if there is to be a proper cohesion of all these agencies to that common policy, with its effect in a beneficial way to the short grass stockman and the general public at large, who of necessity must contribute to the cost of exploiting these lands, if they have been subjected to improper use.

The time has consequently arrived, as a result of known facts and experiences with these lands through the years, for the tax-payer and the public, who must foot the bills, to stipulate through the Government as to how the resources of these lands shall be conserved with a view to contributing properly to both the provincial and national incomes.

It has been shown that in the Western States the keynote of all agencies, as a result of costly mistakes in the past land policies dealing with arid and semi-arid lands, is now conservation and proper land utilization.

As a result, therefore, the Appraiser recommends that the Provincial Government set up an Alberta grass conservation commission very similar to that recently inaugurated in the State of Montana—this suggested commission, with enabling legislation, to carry out a definite policy of conservation of these lands in the short grass area, and also on other sub-marginal lands, whether owned by the province, by virtue of the Crown or by means of tax recovery, and with such lands of the municipalities which lie within such sub-marginal category.

The commission, it is suggested, should consist of the following: the Deputy Ministers or their designates of the Departments of Lands and Mines, Agriculture and Municipal Affairs, together with one member from each of the following: the Short Grass Stock Growers' Association, Western Stock Growers' Association, the South Alberta Sheep Breeders' Association, and the Alberta Municipal Association, making a total of seven members.

The chairman of the commission should be one of the deputy ministers or designate, in order to lend permanency and efficiency in operation, and to demand his full time attention.

All members should be appointed by the Minister, under whose jurisdiction the commission would operate, for a term of not less than four years, when they would be eligible for re-appointment, as this is a long term problem.

While the Department of Lands and Mines controls the majority of these lands, it must be recognized that the problem of land utilization is one involving rural sociology, the human factor and the agricultural policy of the province, and hence the provincial Department of Agriculture is as vitally interested. Therefore, the departmental jurisdiction of the commission should be one which the Government will have to decide upon, and it might call for joint jurisdiction of the Departments of Lands and Mines, and Agriculture, in order to secure maximum efficiency.

The appointment of the commission's members should be made, always with the thought in mind, as set out by Dean Shaw, on the importance of the personnel, that "it is important that those empowered to make plans for a recovery programme for the drought areas of Western Canada be men of sound scientific training with some practical knowledge of the many problems involved."

DUTIES

Such a commission should have complete charge of the policy of all grazing and sub-marginal lands owned by the province, as well as those of the municipalities which come under that category.

The commission should act as a clearing house of information upon the sub-marginal lands of the province and as such should co-operate with all other agencies dealing with this immense problem with a view to establishing proper uniformity of grazing policy, rates and methods in dealing with these lands.

The establishment of a proper policy of land utilization for the province, based upon the compilation of all data and information available from dominion and provincial sources upon the sub-marginal land of its province, as well as lands not under that category.

To make the fullest use of the information available from, and to work in the closest co-operation with, the Dominion Range Experiment Station and other agricultural experiment stations in the province, in the attempted solution of its many problems.

The preparation of a regionalized farming map of the province, based on the soil survey information available, the meteorological data of the Dominion Meteorological Service, crop return data, etc., in co-operation with other departments.

Recognition that climate is the controlling factor, regardless of soil fertility; that lands which produce less than 12 bushels

of wheat per acre annually over a long period of years are uneconomic and should be withdrawn from cultivation, being reseeded to crested wheat grass, etc.

Recognition, too, that there are "islands" or patches of good fertile soil, in almost every arid and semi-arid section, which will produce more than others surrounding such "islands" with the same amount of scanty annual precipitation. Also, that there are more favoured parts which, due to elevation or other local factors, tend to more seasonal and annual precipitation than that of the general area, which may be suitable to farm as economic farm units.

Recognition of economic ranch and farm units which will give the individuals on the land an economic unit, capable of supporting an average family, offering a reasonable standard of living, with proper education of their families. Dependent upon the many factors, previously outlined, such as climate, soil, topography, etc., this may vary for the ranch from a few sections of land to many thousands of acres depending upon such conditions. With the farm unit, it may vary from a half section to two or three thousand acres.

Recognition of the advantages of the community or communal system of living for the individuals and their families of the economic farm units, centered in a favourable location to these units, where they may have the benefits of educational, social, and transport facilities, communication and medical attention, where such units are power farmed. Why should the individual and family be isolated on the farm all winter on "a cowless, pigless, henless farm," after raising wheat, etc., and attempting to get to town in a blizzard for food or coal? If they resided in a community centre or town, they would have no reason to go to the farm until spring work necessitated such, in the meantime enjoying the benefits of the social, medical, communication and school facilities.*

Restriction of cultivation permits to the growing of feed for the livestock of economic ranch units in the short grass area on provincial lands.

Reseeding of abandoned lands for weed and pest control—support and encouragement of wild fowl and game conservation—full recognition of the place of these latter factors in the balance of the province's agriculture.

A policy of selective abandonment of lands, of sub-marginal character, whether through lack of soil fertility, arid climatic conditions or both, and their gradual withdrawal from cultivation.

The setting up of grazing districts from such lands, where it is impossible to give the stock raiser an economic unit, other than through such a pooled arrangement, a community pasture has its place in a farming area. It is doubtful if it has a place in the distinctly ranching area, unless for the purpose, as first stated. Rates on an acre basis or a per head basis must have a loading charge for capital expenditure to offset the capital cost

*Gordon B. Brown, B.Sc., Regina, Saskatchewan.

of the man with heavy ranch capital outlay, or else he is discriminated against in competition with the man whose fences, etc., are fully supplied by governmental funds.

That such commission should set aside 25% of the fees, rentals, etc., from all grazing districts and grazing lands in the short grass area to be used for reseeding operations and range improvements, such as water, etc.

That such commission will recognize that only 20 year leases shall be issued in the short grass area upon economic ranch units, with the recognition, always, of the preference of commensurate ranch property with the present lessee having prior right of renewal, if lease terms have been complied with. This is advocated on the principle that it is better to keep a going concern in business than to have new individuals acquire by trial and error what the present individual has learned through years of experience and has survived.

That the commission recognize that in any adjustments necessary, no present lease shall be reduced in its entirety below a minimum, as set for example in Texas, below that of an economic ranch unit.

That the commission's prime policy should be the recognition of grass as one of nature's greatest natural resources of the province and that its culture and conservation is vital to interests of not only the stockman but to the public of this province and the dominion as a whole.

REMUNERATION

That the Civil Service appointees on the commission be compensated for such additional duties, commensurate with the importance of such commission, and that the members appointed from the associations be paid a per diem allowance, when on work of the commission, as well as expenses.

The commission would require the services of a capable secretary who should be a civil servant.

The commission would be empowered to employ scientific and technical assistance as required and have the co-operation of existing technical branches of home or other governments.

One very eminent authority upon grazing matters in the United States has this to say on the matter:

The employees of the Grazing Service are among the most fortunate in the Government. Why? Because it is their privilege to be part of an organization which is engaged in the most vital conservation effort confronting the American people today, viz., the preservation of the grass and the natural forage resources of the country. If you doubt this statement, pause for a moment's reflection and picture to yourself what would happen to humanity if the world's entire forage crops failed completely—even for a year. Grass is among the greatest blessings which God has bestowed upon his people and no other country in the world surpasses the United States in the quantity and the quality of its natural forage crops. Grass is the basis of our meat supply; it is pleasing to the eye and, therefore, pleasure

giving; it preserves the soil; enriches it and spells the difference between verdure and desert. Properly preserve the natural forage cover and the problem of soil erosion is largely, if not entirely, solved. Permit the destruction of this cover and erosion, waste, floods, starvation and destruction are the direct results.

The remarkable thing about grass is that it is a recurring and continuing resource. Properly used, it lasts forever. Given half a chance it cannot be exhausted. A thousand years after the mines are depleted and the oil exhausted, grass will be lending its protective cover to the earth's surface and making possible the existence of mankind as well as all other members of the animal kingdom.

The natural forage crops produced in the ten Western States where the Grazing Service is administering lands are the only crops that are never a complete failure without irrigation. They grow with very little moisture and will make some growth every year no matter when the moisture comes, just so it comes sometime during the growing season. Not so with cultivated crops—unless they receive the moisture at the right time they are a failure.

This is the salient factor that makes these states so valuable for livestock production and so lacking in value for farming outside of the irrigated areas. Had this been sooner realized we would not now be attempting to reseed millions of acres of semi-arid land which, in the words of the Indians, have been "turned wrong side up." Let each one of us become an apostle of grazing and overlook no opportunity to spread a doctrine which, if carried out, will preserve for future generations, to the fullest extent, the blessings which we now enjoy.*

Mr. Terrett's remarks serve to show the opportunity which an Alberta grass conservation commission as suggested offers in this province for the rehabilitation of the arid and semi-arid lands of the short grass area, as well as for the province as a whole, in the all-important question of conserving this great resource.

They serve to show also the great necessity for such conservation and the proper understanding of this responsibility which the members of such a commission must have in order to put into practice the vision which will lead to its proper fulfilment. Without this vision and the ability to transform it into a realism the work of the members will become a failure.

Truly, as Mr. Terrett says, grass "preserves the soil; enriches it and spells the difference between verdure and desert. Permit the destruction of this cover and erosion, waste, floods, starvation, and destruction are the direct results." The present is the time to adopt a definite long range policy, in order to prevent such results, of which the United States has had so much experience, and of which we, too, have had a taste.

The Appraiser suggests that in the matter of rehabilitation the experiment stations and the stock grower investigate the possibilities of using sorghum in the short grass area to supplement feed supplies from the hybrid varieties being developed in South Dakota. The following article on the results there is quoted in part, as feeds are an important item in costs.

*Julian Terrett, Assistant Director of Grazing, U.S. Dept. of the Interior, Montana Stockmen's Journal, March, 1940; Courtesy—Geo. G. Ross, Aden, Alberta.

REHABILITATION

A half dozen years ago such names as kalo, milo and cane were not in the vocabularies of the South Dakota farmer.

Today Early kalo, Sooner milo and Amber cane are the principal crops of thousands of South Dakota farmers. In another half dozen years a still different plant, already grown but as yet unnamed, may well be the chief crop of South Dakota. Such is the agricultural revolution that has and is taking place in the Northern Great Plains state that a scant six years ago faced bankruptcy not only of farming, its main industry, but the loss of its greatest asset, its rich prairie soil.

Confronted tragically in the winter of 1933-34 with the realization that corn, wheat and other small grain staples would not grow in much of the state in dry years, that they wouldn't even protect the soil from wind erosion, farmers in South Dakota looked around for something that would grow, come wind, drought and grasshoppers. They discovered sorghum.

From a pre-drought planting so small that it wasn't even recorded in Government statistics, South Dakota, in 1939, was fourth among the states in production of grain sorghum, trailing only Texas, Oklahoma and Kansas. More than 6,000,000 bushels of Early kalo, Sooner milo and other grains of sorghum were raised on the prairies of South Dakota last year to help provide the farmers of the state with a more abundant and dependable feed base for the growing livestock industry, an industry which reported a 25% increase in units on feed in the state this past fall, over a year ago, and the industry which, with a dependable feed supply, will solve South Dakota's "dust-bowl" relief problem.

THEY DID THE JOB THEMSELVES

The farmers of the upper plains have taken sorghum so much to their hearts that the story is told of a couple overheard at the showing of a moving picture in which a scene is laid in the upper valley of the Nile. Observing a sequence in which sorghums appear growing on the banks of the ancient river, one of the farmers commented: "Why, look there! That's Sudan grass. Wonder how it ever got way over there in Africa!"

The story of how the semi-tropical plant got way up in South Dakota is another tale of the amazing accomplishments of American initiative and co-operative enterprise. Faced with the necessity of doing something to help themselves, the businessmen and farmers of South Dakota pushed sorghum plantings from an insignificant acreage to a million and a half acres in a half dozen years. And the job cost—in this day and age embarrassment forces one to whisper it—\$1,257.50.

The saga of sorghum in South Dakota begins in that black winter of 1933-34, the winter during which dust storms by the score darkened the skies of the Middle West. A total of 90 dust storms were recorded by the U.S. Weather Bureau office at Huron from the first, frightening blackout in November until the finale in May. The years 1932 and 1933 had been complete failures in South Dakota farming. From an income from the sale of crops and livestock of \$230,829,000 in 1929, the farmers of the state were reduced to an income of \$56,654,000 in 1932 and \$67,778,000 in 1933. The reduction in income from cash crops, exclusive of livestock, was even more drastic. It dropped from \$69,22,000 in 1929 to \$11,087,000 and \$11,727,000 in 1932 and 1933.

Confronted by this agricultural and economic collapse, a small group of businessmen, farmers and farm experts from

the State Agricultural College at Brookings gathered at a luncheon at the Marvin Hughitt Hotel in Huron in February, 1934, at a meeting called by the "Evening Huronite" to seek an answer to the question: "If we cannot raise corn, wheat and our other usual crops in South Dakota, what can we raise in order that we might continue to live in this state?"

The answer came from one of the farmers present, who suggested it might be possible to raise sorghum. State College experts admitted that rather hopeful experiments had been made with sorghum during a previous short-lived drought several years before the World War. But war years, with abundant rains and high prices, caused farmers to forget about everything but the huge profits from wheat and corn. Out of the meeting came the Committee for Safer Farming in South Dakota, an informal organization created to carry on the campaign to encourage the planting of sorghum.

There are, of course, two main types of sorghum. One is the sweet or forage sorghum. This is grown for the feed value in the stalk, which has a high sugar content. The other variety is the grain sorghum, which is grown principally for the seed head. The forage sorghum is limited in its uses, providing mainly a cattle feed that must be consumed on the farm. The grain sorghum can be used to fatten cattle, hogs, and poultry. It can also be sold as a cash crop and transported economically. Both types are drought-resistant. They will remain dormant during a dry period and spring to life after a shower. They use the moisture content of the soil more closely than do the other crops.

For some reason unknown to scientists both varieties of sorghum are as unwelcome on a grasshopper's menu as spinach is on a child's. They will eat it, but they prefer most anything else. When it is realized that, pound for pound, sorghum has about 90 per cent of the feed value of corn, its rapid acceptance in an area of frequent drought can be understood.

SORGHUM ACREAGE SKYROCKETS

But the trouble with the sorghums, as with other crops, is that before they can be grown successfully, they must be acclimated to varying conditions of weather and lengths of growing seasons. Ever since the early experiments by State College shortly after the turn of the century, some forage sorghum had been grown in South Dakota. Never had it been more than a total of a few sections, but always there had been some. For this reason it was felt, in the spring of 1934, that the campaign should be limited to forage sorghum and the Committee for Safer Farming in South Dakota set out to sell the state Amber cane, a leader among forage sorghums.

The Committee for Safer Farming in South Dakota was made up of the heads of South Dakota Bankers' Association, State Press Association and state organizations of the Farm Bureau Federation, Farmers' Union and the Grange. County committees consisting of leading local members of these various organizations were quickly established in 34 counties throughout the state. Literature in the form of pamphlets and posters was distributed from the state central office at Huron to farmers through the county committees.

That the job of selling forage sorghum to South Dakota was done well is demonstrated by the fact that from a pre-drought planting of 15,000 acres a year, the planted acreage in 1934 jumped to 469,176 acres.

Records of the Committee for Safer Farming reveal that the campaign which brought about such results in 1934 cost a total of \$507.50. Of this amount, which was raised by contributions from packers, public utilities, banks and other business houses, \$320.61 went for printing, \$171.89 for telegraph and telephone tolls, stenographers and postage. The trip to Pierre to enlist the support of Governor Berry cost \$15.00.

Many farmers, however, were convinced by the 1934 experience that sorghum offered at least a partial solution to the problems of dry-climate farming. They took to cane with enthusiasm, and the results of their successful experience began to be widely known throughout the state. An outstanding example was that of Albert Selland, a large-scale operator living near Woonsocket in Sanborn County. Selland began planting a feeding cane in a big way. He put in 500 acres of forage sorghum. The checks he received for the sale of canefed cattle totalled thousands of dollars. Newspapers and the Greater South Dakota Association publicized Selland's success. A facsimile copy of a check for \$5,605.30, which the Sanborn County farmer received for one shipment of cattle, was most effective propaganda. The interest in sorghum revived.

DAKOTA-BRED SEED

Amazing though this shift is, it becomes even more exciting when it is considered that all of this compounding of sorghum acreage has been done on borrowed seed. There is still no sorghum which has been developed for the particular requirements of the prairies of South Dakota. But that is coming. Out on the experimental plots at State College, Clifford Franzke, young and able agronomist, has been breeding a combination tailor-made for the Northern plains. Last fall he announced that he had been successful in developing the kind of sorghums he feels will be a large factor in stabilizing farming in the area, adding millions of dollars to the agricultural income of the state in good years and bad.

The new Franzke breed is a combination of grain and forage sorghums, a happy blending of the best features of Amber cane, Sooner milo, Modoc and feterita. There will be no waste, as both stalk and head will be edible. It will grow low to the ground, protecting itself from the winds, and, at 32 to 44 inches high, it may be harvested with a combine. It will be virtually free from hydrocyanic acid, a drawback to most sorghum in its growing stages. Franzke promises to have seed of his new sorghum, as yet unnamed, available to farmers in 1941.

Meantime, startled by the rush to sorghum, South Dakotans interested in all aspects of the state's economic future are studying further possibilities of this crop which is so new to the Northern Plains. A report by L. E. Call, Director of the Kansas Agricultural Experiment Station, has attracted much attention.

THE END OF RELIEF

'Grain sorghum compares favourably with corn in nutrients and in chemical composition.' Call's report declares, 'The average of hundreds of analyses of corn and kaffir—a grain sorghum—shows that the two grains are almost identical in total carbohydrates. Kaffir is slightly higher in protein than corn, while corn is higher in fat than kaffir. Comparative feeding trials that have been made with corn and kaffir show that animals fed kaffir make practically as rapid gains as animals fed corn.'

Industries seeking a supply of grain rich in starch, suitable for use in industrial manufacture, will find in the grain sorghums a product worthy of most careful consideration. Also a product that will be available in increasing amounts in the next few years, probably at a price somewhat less than the price for corn.*

With these facts in mind, business men in South Dakota who have spent \$1,257.50 through the Committee for Safer Farming and the Greater South Dakota Association to join wholeheartedly with farmers in welcoming such new words as milo, kalo and cane to their everyday vocabulary, are looking forward with relish to mouthing the new words and even more promising word name that Professor Franzke of State College will give them in the next few months. For whatever the word is, many of them are convinced that eventually it will spell the end of the need for Federal relief in South Dakota.*

The Appraiser suggests study and experimentation with sorghums, for several reasons—their feed value, their drought resistance, as they can remain dormant over long periods of drought and then come to life after a shower making the maximum use of the soil moisture present, and last but not least, their resistance to the ravages of grasshopper infestation and attack. For these reasons, therefore, they present many possibilities for the short grass area if suitable adaptations of the known varieties can be made for these prairies.

In the rehabilitation process the greater use of crested wheat grass by the stockman has been mentioned before. It should be kept in mind that its originator in Canada, Dr. L. E. Kirk, Dean of Agriculture, University of Saskatchewan, undoubtedly did not intend that it should supplant the native grasses but, on the contrary, supplement them. In the development of a prolific seeder which would hold the soil and would be of good feeding value, he has been successful, but native grasses will hold their own with it, and seeding with it gives them a chance.

MARKETING —HIGHLAND HEREFORD ASSOCIATION

In a study of production costs such as this, markets and marketing are important, and the Appraiser, from the facts gathered, is of the opinion that the marketing of cattle from the short grass area is one of the weak spots, still being bound up in the tradition of sale, f.o.b. the ranch. The sheepmen have made an advance by co-operation, and the Appraiser submits the following story on successful co-operative marketing of cattle by a group of Texas cattlemen, started away back in 1919, when they were encouraged by the "mail order" success of the late Frank Hastings.

Twenty Texas cattlemen walked to a feedlot in Iowa. They climbed upon the fence and watched a herd of sleek white-faced steers making beef of the Corn Belt's main crop.

"Looking good," observed W. B. Mitchell, sliding off the fence inside the lot and circling the animals. "Mighty good gains, if you ask me."

*"Sorghums Settle the Dust," by Robert D. Lusk, "Country Gentleman," May, 1940.

The others followed Mitchell, and the Texans gave the fattening Herefords a thorough examination. They went through all the routine of a stock-judging team, taking mental measurements of the steers. Even a keen observer of Texas cowmen in trading clothes would have hazarded a guess the men were planning to buy the steers from the Iowa farmer.

But Texas cowmen do not buy corn-fed steers in Iowa, Illinois, or any other state. Texas cowmen raise steers, thousands of them, and sell them to Corn Belt feeders who finish the beef for the nations skillets and roasters. Therefore, the Texas men could have no idea of bargaining for the fat steers.

As a matter of fact, the Texans had sold the steers several weeks before. They had been paid cash on the barrel head and could have had no further financial interest in the Herefords. But nevertheless, the men had made the long trip to Iowa to see the steers and the hundreds of other Herefords they had sold to the Corn Belt feeders.

They visited many feedlots in Iowa, Illinois and other states and inspected the calves and steers they had sold. They went to market with some of the fat steers. They checked closely the reactions of the buyers of the animals. They went to their hotel enthusiastic and happy after the steers topped the market, although the Texans long ago had relinquished any claim they had on the beef.

THE TWO ESSENTIALS TO SUCCESS

The 20 men were members of the Highland Hereford Association of the mountain ranges in the Texas Big Bend country, an organization that has made its feeder calves and steers nationally famous and the first choice among the Corn Belt's major feeders.

The association's work has developed one of the most successful community projects in American agriculture. The records show the fact. So do the pocket-books of the Highland ranchers. And major feeders who go year after year to the rugged highland ranges in the Big Bend to buy their calves and steers will attest the fact, for they pay on an average three cents a pound premium for Highland Herefords. Top lots have brought as much as six cents a pound premium.

The association has developed the two essentials to success in the cattle business—the product and the market. It has developed the type—it is commonly designated a breed—of cattle the feeders need and want. It has developed a permanent market, one that is dependable and willing to pay big premiums for quality cattle.

Composed of 81 ranchers in three counties in the extreme southwest portion of big Texas, the association manages its business without promotional schemes. It has no legislative committee. Its success lies in the fact that it produces the goods, as premium prices and the lists of champions at the big livestock shows in Kansas City, Chicago and elsewhere show.

The trip to Iowa by the 20 busy ranchers last spring is typical of the Highland ranchers' enterprise. It was not a pleasure trip. It was straight business. Normally, when a cowman sells or trades a calf or steer he forgets the animal and devotes his time and attention to the production of another calf or steer. But not the Highland ranchers. They want to know how their calves and steers respond to feed and what sort of prices they bring when they go to market. So the ranchers check up.

In the Corn Belt last spring they looked over many of the carloads of Highland cattle they had sold the previous October. They compared the Highland Herefords with Herefords raised in other sections of the cow country. They talked with feeders, and asked questions about possible further improvements of the cattle. They acquainted themselves with the problems and the needs of the men who buy their cattle. They went into the financial end of it, determining whether the feeders of Highland Herefords were making a profit. No detail, no matter how small, was overlooked by the 20 Texans, for it is their goal to produce calves and steers that will be first choice of the feeders. Their project is far past the experimental stage too. It is a major success.

In October, 1939, the feeders the Highland ranchers had visited flocked again to Marfa and paid premium prices for all the Highland Herefords they could buy. They were willing to pay premiums because Highland cattle bought the previous fall had topped markets as prime finished beef.

The annual auction of Highland Hereford at Marfa is one of the biggest events in the cattle country. Several days before the date of the sale in October, feeders from Indiana, Illinois, Iowa, Ohio, Kentucky, Kansas, Pennsylvania, New York, California, Georgia, Missouri, New Mexico and parts of Texas flocked to the ranches in the rugged Davis Mountains to look over the year's crop.

On the day of the sale, 46 carloads of sleek steer calves, heifer calves and yearling steers went through the ring in one hour and thirty-eight minutes. There was little choice. One lot of Highland Herefords is as good as the next. From the ring the Highlands were driven on scales and weighed. A few minutes later they were loaded on special freight trains and headed for a dozen states. The sellers do the shipping, pay the freight to the buyers' feedlot—anywhere in the nation. The Highland ranchers are so particular about their Herefords, even after they are sold for cash, that they don't want the cattle shipped except on special trains.

After the sale the Highland ranchers' pocketbooks bulged. The Herefords sold for an average of better than 10 cents a pound a day when the ordinary run of the better type Hereford feeder was bringing seven and eight cents delivered. The top at the Highland sale was 14 cents a pound for steers sold to E. F. Goecke, of Lamoille, Iowa.

The sale was the ninth annual one. The association was organized in 1919, only a few years after Pancho Villa's border raids, and the ranchers set out to foster the breeding of better cattle and the selling of the better breed at an advantage. The story of their success is an exciting one.

Ranchers in the mountainous region had reached what looked like a crisis. A few valley spots in the rugged mountains could be farmed, but there could never be feed enough to finish the cattle produced on the Highland ranges. For the man with a commercial herd there was only one thing to do—raise feeders. But the feeders he raised were in competition with those produced throughout the range country. That sort of thing was, and still is to no little degree, a pretty risky business, particularly in a region so far removed from the big feedlots.

SELF-HELP IN A CRISIS

W. B. Mitchell, a ranchman all his life, had observed that cattle raised in the Texas Highlands had strength, sinew and

big bone. He decided that, if ordinary cattle responded to the climate and grass, a good breed would respond still better.

Mitchell, W. W. Bogel and a score of other Highland ranchers decided to pool their efforts in producing better cattle and developing a dependable market. The first action was the writing of the association's rule: "No man is admitted to membership in the association whose business integrity and methods of dealing are known to be questionable, and no man is admitted to membership unless his cattle possess prescribed standards of quality."

The last requirement amounted to this: The best available Hereford bulls and carefully selected females.

The new association 'branded' the members' cattle with a trade name—one destined to become as famous among ranchers and feeders as Domino is to purebred Hereford breeders—the Highland Herefords.

The first job was that of improving the cattle. The best purebred Hereford bulls money could buy were imported to the mountain ranches. Females were carefully selected to replace cows culled out. The ranchers were not interested in pedigrees. They wanted results. They wanted big-boned, sturdy calves that would develop rapidly and respond to feed. In their breeding, the ranchers worked toward development of uniformity in size, build and color.

If an expensive bull failed to produce he was sold immediately. No faulty bull or cow was used for breeding, and if a bull or cow produced an off-color or off-build calf, that bull or cow was considered faulty regardless of its pedigree.

This care in selection and breeding produced a distinctive type of cattle. So uniform are the feeder calves and steers, a rancher can hardly distinguish between his own and his neighbour's cattle.

Big-boned, sturdy, beefy with sheet-white faces and deep red coats, the Highland Herefords are easily distinguished from the ordinary Hereford, and so careful has been the breeding that many herds in the Big Bend country are almost pure bred Herefords.

BUILDING AN IDEAL CALF

While gradually improving their cattle the Highland ranchers started their trips to the feedlots. They watched as closely the progress of the cattle they had sold as did the man who was putting high-priced corn into the cattle he had bought. From these observations they determined what sort of calf made the choice feeder, an animal which quickly turns feed into prime beef worth the top on the market. Then they bred for that sort of calf.

There was no guesswork. The thing had to be done the right way.

The results were pleasing, not only for the Big Bend ranchers but for the men throughout the country who buy cattle and pour expensive feed down them with the hope of realizing profit.

Success did not come to the Highlands in one year. After the association had begun improving its cattle the members started shipping feeder animals to the Corn Belt for sale in auction rings. Year by year the Highland stock became more popular with feeders. Then the annual sale at Marfa, a picturesque town high in the mountains, was successfully in-

augurated. A bulk of the Highland cattle are sold feeders at the sale, but many heifers go to other parts of the cattle country as foundation stock.

PROTECTING THE GRASS

The natural tendency, once a choice type of cattle was developed and a dependable market established, was to raise more cattle. But W. B. Mitchell and the other members knew too much about the cattle business to risk any such action. They carefully guarded against over-stocking, and when drought years came they quickly reduced their stock so they could protect their precious grass.

Although the ranchers didn't know it at the time the association was established, it was the Highland grass that caused quick development of calves in that region. The Big Bend country has almost unexcelled variety and quality in its grasses, which provide close to a balanced ration for cattle the year round.

The grass was a natural resource. The association members didn't have to develop or produce the grass, but they were shrewd enough to know how to preserve it. A Highland rancher would sell off his prize herd before he would have his grass eaten out by the roots.

Mitchell, who looks more like a banker or business executive than a big-scale Texas rancher, explained the success of the association's work in these words:

"We are buying the best bulls money can buy and we are carefully culling our females. We are doing everything possible in the breeding improvement program the association undertook when it was organized. Reports of top prices being paid at the markets for finished Highland cattle are not in the least unusual, and we consider the best recommendation for our feeder calves the repeat orders we receive every year. We have on our books many customers who have not missed feeding Highland Herefords a single year since we organized the association."

The success of the Highland Herefords has awakened cattlemen in other sections of Texas to the possibilities of producing fine feeder cattle and developing a good market.

Last year Vance Johnson, Texas Panhandle newspaper editor who long has been interested in the production of Herefords, made a talk at a meeting of the Panhandle Hereford Breeders' Association.

He reviewed the success of the Highland cattle and said, "We must do something like that if we intend to retain a prominent place in the Hereford business. I suggest that we start by branding our plains Herefords by giving them a trade name. That Highland name is catchy. It works like a nationally known brand."

The breeders favored the plan and a Panhandle-wide contest for a name for the region's Herefords was conducted. The name "Panhandle Herefords" was selected.

Show-herd owners also have taken a hint from the Highland breeders. Success of Highland show herds has been amazing. A Highland product was the 1935 grand champion of the Chicago International. A Highland was the Hereford champion at the same show in 1934. Since then Highland cattle have won a big part of the ribbons offered Herefords at the show. They were awarded eight of 18 prizes in 1937 and again in 1938.

Other Highland show winnings include grand champion in the fat and feeder classes at the Great Western Livestock Show at Los Angeles in 1937 and 1938, grand champion in fat cattle at Baltimore in 1938, and grand champion in fat cattle at the Ohio State Fair in 1937 and again in 1938. At the Ohio Fair in 1938 the Highland winner brought the top price paid for Hereford beef that year—\$26.50 per hundred-weight. At the winter shows in 1939 the Highlands again captured honours, winning in many classes in the South, the Middle West and the East.

There are few if any regions in the nation that can boast of show winnings equal to those of Highland Herefords. And the development has come within comparatively few years as direct result of the Highland Hereford Association, an organization of extraordinary cattlemen who have done extraordinary things simply by planning and carrying out their plans.

For years their region had been a cattle country. Because of its ruggedness it couldn't be anything except stock country. It is truly a highland region. The elevation ranges from 5,000 to 9,000 feet above sea level. The area is one of the most picturesque in Texas and is as rich in historical romances as is the Rio Grande that cuts through the rugged mountains and swings greedily into Old Mexico and gives the region its colorful name—the Big Bend.

Development of the distinctive cattle in the Highlands has not been the work of youngsters out of agricultural colleges. The old-timers have done it. Fully 90 per cent of the cattle herds grazing on the grassy slopes of the Big Bend Highlands were established in the 'eighties. The Mitchell herd was established in 1884, the Bogel herd the same year. Even in those early days of open range, the region produced good, but not distinctive, cattle.

W. B. Mitchell is no youth, but he is still eyeing the future for Highland cattle. In his travels in the interest of the association last spring and summer he toured the old South, talked to cattlemen, told the story of the Highland herd. Since then many Highland Herefords have gone to the Old South as foundation stock.

The success of the association he helped establish is a shining example of what community enterprise, even in a sparsely settled, rugged cow country, can do. In the cattle-producing region of the nation it stands out like a Highland Hereford at a feeder sale or in the show ring at a big exposition.*

Many short grass stockmen may have read and are familiar with this story of the Highland Herefords, but it must be emphasized that this Association and its success have been the work of old-timers, with each realizing that the success of the Association depended upon the strength of its weakest link.

Their inspiration came from the success created by the arrangement of a "mail-order" business, established with corn-belt feeders, by the late Frank S. Hastings, then general manager of the S. M. S. Ranch of Texas in the latter days of the last war. The operations of the S. M. S. Ranch are quoted elsewhere in this Report.

The other ranchers were also willing to back up Mr. Mitchell's idea. They realized that it was a case of one for all

*"The Highland Herd," by Lewis T. Nordyke, "Country Gentleman," April, 1940.

and all for one, an idea which has made the Association a success, and if they did their part, that which benefited the Association benefited them all.

What was their foundation in the beginning? The question is answered by Mr. W. B. Mitchell, who has supervised their sale during 1922 and who states as follows:

Our organization work has been surprisingly profitable in many respects. It has effectively dispelled the idea that breeding cows merely to get a calf crop is profitable. We have practically succeeded in eliminating the nondescript calf, and have standardized our product to such an extent that we are able to ship whole trainloads of calves that look and are exactly alike. We have established the principle that it is no more difficult to raise a good than an indifferent calf, establishing among our members a fixed type. Another object aimed at is a maximum calf crop, which is accomplished by conservation and development of range resources. All this has resulted in a transformation within a few years—not only with respect to quality, but also in volume of production.

INCREASED COST OF HIGH-QUALITY CALVES

When the Highland Association began its co-operative work, it had a race of cattlemen to deal with. The fathers of the younger generation had been in the business, but in many instances had not taken full advantage of this opportunity, breeding merely for numbers, and frequently falling short of that goal. Calf crops ran as low as 50 per cent; whereas, with conservation of resources we are now able to surmount adverse physical conditions and make calf crops of 80 to 85 per cent. Members who had the least efficient cow herds on our range a few years ago are now the most critical and discriminating of breeders. Our program includes development of nutrition by increasing milking capacity, of which there is great possibility with the Hereford, and carrying water to the cow instead of requiring her to travel. A range cow under necessity of journeying 10 to 15 miles to quench her thirst does not have adequate opportunity for milk production, and raising such calves as Corn Belt feeders require cannot be accomplished with deficient nutrition, no matter how much quality is injected. Some of our pipe-lines run five to nine miles, and, by conserving water, we are able to utilize grass to maximum advantage.

This is a very practical scheme for the production of strong, uniform calves with quality at weaning time. It means that the range cattleman is adapting his business to the breeding conditions and he is enabled to get an annual turnover of his stock instead of having to carry them into the yearling or two year old stage. Any business which has a rapid turnover can operate upon a smaller margin than one with a slow turnover, hence it means a more profitable business for the cattleman. This more or less means following the lead set by the sheepmen who have gone, of late years, entirely on an ewe and lamb basis. To insure profitable rehabilitation, the western cattle industry must be put upon a breeding-herd basis, producing young cattle with such quality that they can convert small gains and roughage profitably. There may be places where this plan could not be followed but the day when it was profitable to raise an aged grass steer has gone. Therefore, Western Cattlemen must either market young cattle with

quality or finish the older types themselves on good concentrates and roughage if they are not to go out of business.

The community plan of operation developed by the Highland Hereford Association of Texas has demonstrated efficiency and economy. It has given the product of its members a standing that would have been impossible by individual effort. They select committees for transportation, selling and selecting the calves. This year all calves selected as suitable for shipment will be earmarked with tags bearing 'Highland '23.' Some calves last year fed for the International made a daily gain of $21\frac{1}{2}$ pounds, for the feeding period. This shows what quality cattle can do and shows that the west can produce the desired type if they only breed for them.

The quotation from Mr. W. B. Mitchell is an extract from a letter written to the Appraiser in 1923 during the latter's preparation of his thesis, and shows how the foundations of the association were successfully laid and how, after a lapse of 17 years this association is proving more successful than ever.

It is an outstanding example of real co-operative effort amongst good cattlemen carried out to their individual and collective advantage and crowned with success—a success which could not have materialized with individual endeavour.

After 20 years of such successful operations, the Appraiser unhesitatingly commends a similar effort being made by the short grass stockmen of Alberta, and suggests that the association invite Mr. Mitchell to come to one of the Alberta conventions with a view to his relating the story of what the Texas cattlemen have done and are continuing to do. The short grass growers of Alberta can do the same and secure the same success.

AUCTION SALES

The Highland Hereford Association method of selling is largely based upon that of the auction sale. Originally they shipped the cattle to the Corn Belt for sale by auction to the feeders. Of late, however, they are holding their sales in the Highland country of Texas with the feeders buying them there.

The short grass stockmen took a step forward in their marketing in 1939 by holding community auction sales throughout the area which in the main were very successful. The Appraiser is of the opinion, however, that the ultimate success of such auction sale methods must depend upon the firm foundation of a standardized product made possible by co-operative effort, as carried out by the Highland Hereford Association. The short grass stock grower can possibly cut his costs still further by the co-operative buying of bulls, together with the purchase of other materials including machinery, which would only be available to him on this improved basis by co-operative buying.

The auction sale method for short grass livestock appears to be a decided advance over the old individual sale method f.o.b. the ranch, but its ultimate success must be a fairly standardized product conforming with the buyer's demands regarding

quality and sold at a fair price. Upon this will depend the buyer's return the following year, resulting in repeat business being established.

The short grass stockmen's interest in his product should not cease until it is on the consumers' table, if he is to know what the market really wants, and how he can improve on quality. He can well afford to see what his stock is doing in the feed lot, or at least take the time to write and find out, if the former is not possible, and take a tip from the operations of the Highland Hereford Association and their success in securing repeat order business.

BEEF GRADING

Beef grading is very much in the public view at the present time and may prove to be of great importance to the short grass stock grower, who is raising quality cattle for the market, either as feeders or as fat grass cattle. It should be worthy of his full consideration as a possible step taken in the right direction, for it may result in providing a market for quality products, which in turn has a direct bearing upon his cost of production. It costs no more to produce a quality product, than a quantity one, provided that a market for the quality one is available at a fair price to both producer and consumer.

RECOMMENDATIONS TO THE GOVERNMENT

1. Recognition by the Government of the importance of grass as one of the greatest natural resources of the province.

2. The adoption of a policy of conservation of this resource for the province, and its enforcement, rather than the immediate question of present revenue return from such.

3. Recognition in the regulations that this resource is divided in the province, climatically, into three distinct areas: short grass, foothills and mountain, and northern, with provision to be made for the administration of each area, each distinct from the others, to meet such conditions.

4. Formation of an Alberta grass conservation commission, similar to that of the State of Montana, consisting of the following members: Deputy Ministers of the Departments of Lands and Mines, Agriculture and Municipal Affairs, or their designates, one cattleman each from the Short Grass Association, and Western Stock Growers' Association, and one representative from the municipalities—a total of seven members. The chairman preferably to be one of the deputy ministers or his designate for permanency and efficiency.

5. The conservation commission to have complete charge of the policy of grazing lands and submarginal lands of the province, those owned by the Crown, either original or by tax recovery, and those of the municipalities which have become abandoned. The commission to act as a clearing house of information upon the sub-marginal lands and as such to co-operate with all other agencies dealing with this immense problem with a view to establishing proper uniformity of grazing policy,

rates, and methods in dealing with these lands. As such to collect, compile and consolidate all information relative to soil, climate, and past performance of all lands in the provinces available from dominion, provincial and other sources. Co-operation of and with other agencies having conservation as their main objective, with fuller use being made of the information and co-operation of the Dominion Range Experiment Station at Manyberries, Alberta. Land utilization policy for the province and the preparation of a regionalized farming map of the province as most necessary for a proper agricultural policy.

6. Recognition that climate is the controlling factor, regardless of soil fertility and that lands which produce less than 12 bushels to the acre of wheat on the average over a term of years are uneconomic and should, therefore, be recognized as sub-marginal, withdrawn from cultivation and reseeded to pasture. Recognition of economic farm and ranch units for different areas. That no more cultivation permits be issued upon provincial lands in the short grass area, except upon those lands now cultivated and necessary for the growing of feed for use in conjunction with economic farm and ranch units so as to provide a reasonable standard of living for an average family. That an expanded policy of reseeding such sub-marginal lands of the province by such a commission be one of its objectives.

7. The commission to have a policy of selective abandonment of such sub-marginal lands and to adopt their gradual withdrawal from cultivation.

8. That at least 25 per cent of the revenue derived from provincial grazing lands be used for the use of permanent range improvements, such as reseeding operations, stock water improvements, etc.

9. Recognition that the community pasture has a place in a farming area but that it is doubtful if it has such place in a distinctly ranching area, unless it is impossible to give the individuals of a range area economic ranch units for proper range operations, when a joint grazing district under the commission may become necessary. Complexity of land ownership may also make this necessary. Rates of such must contain capital loading charges for fence costs, etc., otherwise they may be unequitable with other leases where capital expenditures for fences, etc., are not made from public funds.

10. Re-assessment of titled grazing lands to bring them down to their real economic value within the province.

11. Recognition that the economic ranch unit is one capable of supporting approximately 500 head of cattle, or its sheep equivalent, in the short grass area.

That the carrying capacity should be defined as the area of land capable of supporting one head of cattle, or sheep, representing a unit in good commercial or breeding condition.

That the economic unit for the short grass area is one capable of sustaining the above number of head, fully supported by adequate feed reserves, and land capable of producing such

either by irrigation or dry farming methods. It is axiomatic "that the capacity of any ranch is limited by the least of its seasonal ranges."

12. Recognition that security of tenure is essential to the successful conduct of the range livestock business, and that 20 year leases only be issued in the short grass area upon economic ranch units, with the additional recognition always of commensurate ranch property adjoining being allowed first consideration with the present lessee given the prior right of renewal.

That it is essential to keep a going concern in business rather than to attempt to have new individuals acquire by trial, error and experience what the present operator has learned through bitter experience and in spite of such experience has survived.

13. That no lease be reduced in its entirety and that a minimum area be established as in Texas with no reduction in size below that of an economic ranch unit.

14. That the Government accept the Short Grass Stock Growers' Association's proposals of grazing rates, set in relation to market price and carrying capacity as a practical one for voluntary experiment by those ranchers who have expressed their willingness to co-operate and by any others of the short grass area who in addition may volunteer. That such men use the Mont. Saunderson Ranch Record System for uniformity, a system affording a real opportunity for discovery of costs. The setting up of zone committees to advise any necessary adjustments from time to time. The co-operation of the Dominion Range Station in checking any disputes as to carrying capacity. The use of Dominion Range Survey figures for any necessary adjustment of costs. Such co-operation will unquestionably facilitate departmental administration.

15. That it be recognized that the former grazing rental of two cents per acre, flat rate, plus two cents per acre, provincial taxes, is unequitable in its total of four cents per acre in the short grass area during periods of extreme drought and low prices. That even under the zone rate system of the province, under such conditions, value could not be given for levies made. That consideration be given, therefore, to a 25 per cent reduction in the accumulation of arrears of rentals since 1932 in the short grass area of the province, without interest, with the balance spread over a period of 20 years to meet comparable reduction features of other competing range producing areas, with full consideration being given to the individual who had paid such rentals up to date under such conditions. In the Appraiser's opinion, adoption of such a recommendation would remove a heavy drag upon the industry.

RECOMMENDATIONS TO THE STOCK GROWER

1. That the stock grower recognize the primary necessity of keeping a proper system of records, so that he may easily determine his costs and so be in a position to stop the leaks in his business.

2. That he pay more attention to advertising his business, both individually and through his associations, in keeping his business before the general public and demonstrating its importance in the economic life of the dominion.

3. That he make a fuller and more practical use of the unlimited amount of information available from the Dominion Range Experiment Station than possibly he has in the past, for his individual and collective financial benefit.

4. That he recognize more fully that grass is an almost never failing resource, if properly and reasonably protected under modern scientific methods of range management. That over-grazing is a costly process upon his pocket-book; and that his co-operation is necessary for the conservation of grass, failing which it must become the duty of the Government to enforce it. Conservation, properly used, should be his key note as well as that of the Government.

5. That as his competitors have learned by improved methods to cut costs he should take more care in culling his herds, placing emphasis on quality, not quantity. That he should support any policy emphasizing this which will make for a better market for his product, such as, for instance, beef grading or Dominion Purebred Bull policy; that more attention be given to riding the herd during the breeding season, better feeding and handling of the breeding herd to raise calf crop percentage; that more study be made of mineral and other supplements to raise such calf crop percentage.

6. That he consider the "Partifeco System" in his hired labour problem as adding stability to labour and reducing such costs.

7. That he realize that marketing of his products is one of the weak spots of his business, that he suffers possibly from being too much of an individualist and not sufficient of a co-operationist, with tradition playing its part of sales f.o.b. the ranch. That he could gain much by selling in association with his fellow stockmen, as exemplified by the Highland Hereford Association of Marfa, Texas.

8. That he realize he is not finished with his product, in his own interest, until it is in the hands of the ultimate consumer, even though he may have ceased to have any direct financial interest in the transaction. He must be prepared, therefore, to co-operate fully with the packer and retailer in realizing what the public demand may be and assisting in the creation of the demand for good beef.

9. That he more fully realize that this is an era of co-operation, that in union there is strength, so that his active membership and support of his stock growers' associations are essential to his success. That the Western Stock Growers' Association Journal "The Canadian Cattleman" is the show window of his business, and is, therefore, as essential to him as his saddle. That the support of such, continuing to make it a still greater success, is essential to him as an individual.

10. That he give greater thought to the matter of fire protection to his properties. That due to his usual isolation

a serious fire can cripple his operations for years afterwards, and that proper fire guarding, together with other protective measures are necessary, especially in wartime, to eliminate waste.

RECOMMENDATIONS TO STOCK GROWER ASSOCIATIONS

1. That the associations recognize the value of grass conservation to both the province and the dominion, and that associations should be the foremost proponents of conservation in all its forms including wild life.

2. That the associations give the fullest consideration to the matter of advertising their products in the position of associations and individuals, giving the fullest support to the "Canadian Cattleman" as the show window of their business.

3. That the associations, after careful consideration, give their fullest support to the matter of forming an Alberta grass conservation commission, and to any other portions of this Report which they may deem suitable for adoption.

4. That they endorse and co-operate in the matter of the Special Committee's proposals, after full consideration of same, for the payment of grazing fees established upon a carrying capacity and price basis, as presenting a decided advance in the proper utilization and conservation of grass as a valuable natural resource, over the flat rate per acre method.

5. That the associations give their fullest consideration and support to any policy which will approve and improve the quality and markets of products of the associations' members, such as for instance, the improvement of beef grading.

6. That the associations give full consideration to the treatment of stock for Warble fly infestation—a treatment which will offer possibilities for reduction of costs and improving the quality of the product.

7. That consideration be given to the matter of the co-operative purchase of bulls by the associations with a view to reduction of both initial costs and use charges.

8. That the associations give full consideration to the matter of the co-operative marketing of their products, based upon the ideas and methods of the Highland Hereford Association of Marfa, Texas, and further consideration and support of a community auction sales association as an advance in the methods of marketing their products.

9. That the association conduct an educational campaign amongst their members with a view to impressing them with the advantages of keeping adequate records in their business, financial stability resulting therefrom.

That such a campaign should deal with the question of proper salting, riding during breeding season and the use of mineral supplements and other methods, all of which may tend to cut costs, as already mentioned in this Report.

That it should deal with the work of the Range Experiment Station and that the fullest support should be given to it, so that its work may be of the broadest scope and benefit to the industry.

That it should deal with the matter of rural fire protection, endorsation and support of the annual fire prevention campaigns of the Dominion Fire Protection Association of Ottawa and of the National Fire Protection Association (International) 60 Batterymarch Street, Boston, Mass., U.S.A.—both non-profit organizations with similar objectives—and that the membership of stock growers' associations in both of these fire prevention associations mentioned above should be entered upon because of the serious bearing fire loss may have upon costs.

C. GRAHAM ANDERSON,
Grazing Appraiser.

CONCLUSION

VALUE OF STOCK INDUSTRY, SHORT GRASS AREA, ALBERTA

The gold mining industry in Canada is an important one in the economics of the Dominion, and the Lake Shore Mines Ltd., for example, purchased \$28,204,657.00 worth of supplies of all kinds from Canadian industrial sources from 1918-1939 for their mines, which included groceries and meats. Of that sum and over that period, \$604,000.00 was spent on these last two items to feed the miners, with probably one-third of this amount or a quarter of a million dollars in the item of meats.* A large proportion of the animals used in such products originated from the short grass area of the west.

To show the integration of the short grass area's stock industry in Canada's economics and its relative importance to same, the Appraiser refers once again to the records of Ranch No. 8, as an accurate example, especially in view of the fact that both cattle and sheep are run in their operations.

During the period, 1926-1938 inclusive, the total gross revenue from ranch production was \$644,305.67 or \$40,000.00 more than the total grocery account of the Lake Shore Mines Ltd. for the 21 years already referred to. This ranch purchased in their operations during this latter period (whilst the cow converted the natural forage of the area into human edible products for the rest of Canada) \$37,581.24 worth of groceries and fuel. Repairs and maintenance supplies were valued at \$19,424.04; the automotive industry was paid \$28,807.13 for car and truck expenses. Chemical manufacturers got \$4,753.25 for vaccines and dipping chemicals. General agriculture benefited by \$25,698.05 for hay and grain purchased. Labour received \$106,206.34 in wages which were naturally spent locally in the area of this general business. Governments during this period levied general taxes and lease rentals amounting to \$113,803.25. The total of all these items came to approximately \$350,000.00 which was contributed to general business or about \$1,000,000.00 when including the livestock sold for consumption.

It is pointed out that this contribution to Canadian economic life, made by this ranch, which stands as an example of the industry of the short grass area of Alberta, was made throughout periods of high and low prices, hard winters, extended periods of drought with short forage, devastating storms with their attendant high stock losses, without any additional burden to the general taxpayer for the item of seed and feed relief.

A conservative estimate, made on the basis of the 1931 Dominion census, shows that there are approximately 600,000

*Lake Shore Mines Ltd., Kirkland Lake, Ontario, Toronto Saturday Night, "Progress of Gold Mining," issue of March 9th, 1940.

head of cattle on the short grass prairies of Western Canada, together with approximately 560,000 head of sheep covering the same area.

The total value for these cattle is in the neighbourhood of \$63,000,000.00, and of the sheep, \$7,180,000.00, representing a total investment in the industry of approximately \$70,000,000.00.*

Taking Alberta's share very conservatively at 50% of this last figure, the province's total investment in its livestock industry in the short grass area is approximately \$35,000,000.00. From the foregoing disclosure the general public will appreciate more fully the great importance of the industry to both Alberta and to Canada. It will be easily realized, therefore, that an industry of such size and importance would request that such a Report as this be made after a thorough investigation of all the facts, so that some better understanding of the industry's many problems might be placed not only before the Government but also before the people of Alberta and the Dominion.

Major H. G. L. Strange, Research Division of the Searle Grain Company, Winnipeg, estimates that there are approximately four million acres of land within the short grass area of Western Canada which, because of the long term climatic factors and sub-marginal soil conditions, will be withdrawn from wheat production and return to its natural environment, namely, grass. The increased importance of the future ranching industry of this area can, therefore, be more fully realized, especially in consideration of the fact that the present wheat situation in Western Canada, as a result of war conditions, constitutes a very real problem.†

Attached in the Appendix is a map showing the entire vegetative cover of Western Canada with the general outlines of the "Palliser Triangle" as set out in the report of Captain John Palliser to the British Government approximately 70 years ago. His report has been dealt with many times during the last 10 years due to prevailing drought conditions in Western Canada during this period, and it is only necessary to point out in conclusion, therefore, that the short grass area of Alberta comprises an important part of this triangle. The industry which has been mainly responsible for the settlement of this part of the "Great American Desert" is the livestock industry. In view of the facts as already stated it will continue to grow, and will prosper, because of the rising importance of grass in our agricultural economics.

In areas considered more favourable, trends may take place from cattle to sheep or *vice versa*. Some of the good "soil islands" will not doubt prosper with large power farmed economic units, 2,500 to 3,000 acres in size, for the raising of wheat—"the cowless, pigless, henless farm." Community farming may take place in other parts to meet the rising costs of production for the small individual, and further irrigation schemes in places considered suitable may be organized with

*Files, Dominion Range Experiment Station, Manyberries, Alberta.

†Interview, Appraiser, August, 1940.

capital supplied by national contribution for the purpose of intensifying agriculture wherever possible. Grass, the natural vegetative cover, will, however, through the medium of the livestock industry of the short grass area, continue to be the backbone of agriculture for this great section of the province. To the improvement and future success of the industry this Report is sincerely dedicated.

In concluding this Report upon costs and grazing rates in the short grass area of Alberta, the Appraiser desires to express publicly his appreciation to the Honourable N. E. Tanner, Minister of Lands and Mines, and to the Deputy Minister, Mr. John Harvie, for the opportunity of investigating this large and pressing problem and for being given a free hand with a view to ascertaining the facts.

After being intimately acquainted in one capacity or another with some of the problems of the stockmen of western Canada for some 25 years, it has been a pleasure to endeavour to assist these men in some small way. To know them intimately and frequently enjoy their hospitality is to know their broad outlook and unsurpassed courage in meeting the continually changing conditions of the industry over that period of time.

To Mr. George Ross, President of the Short Grass Stock Growers' Association, whose kindly counsel has been of inestimable value and assistance, and to everyone who has so kindly assisted with information—written, printed or verbal—who has otherwise helped to make this Report possible, the Appraiser expresses his most sincere thanks.

Should any detail have been overlooked in this Report, the Appraiser craves indulgence for the reason that there has been a definite limitation of time for its completion due to his impending call for war service.

If the Department, the Association and the stockmen cannot be individually in full agreement with the findings of this Report, but should each be able to find therein one or more items of value in the matter of lowering the costs of production, or if it should give to any or all, including the general public, a better understanding of the problems of the short grass area, and a proper aspect towards conservation and rehabilitation of grass, the great natural resource of this province, then the Appraiser will deem that compensation for this effort of service, for the "midnight oil" consumed and for the work entailed in the preparation of this Report, has been received.

C. GRAHAM ANDERSON,
Grazing Appraiser.

Medicine Hat, Alberta,
September 11th, 1940.

APPENDIX

The following is a list of persons the Appraiser and the Special Committee are indebted to, for the submission of material and information, by personal interview.

PERSONS INTERVIEWED IN THE COURSE OF THIS INVESTIGATION

- James Mitchell, President, Western Stock Growers' Association, Medicine Hat, Alberta.
- Olaf Olafson, President, Saskatchewan Stock Growers' Association, Old Wives, Saskatchewan.
- Dr. S. E. Clarke, Dominion Agrostologist, Dominion Experimental Farm, Swift Current, Saskatchewan.
- L. B. Thomson, Superintendent, Dominion Experimental Farm, Swift Current, Saskatchewan.
- Robert Scott, Sheep Rancher, Tilley, Alberta.
- Jack McLane, Secretary, Short Grass Stock Growers' Association, Medicine Hat, Alberta.
- H. J. Hargrave, Superintendent, Dominion Range Experimental Station, Manyberries, Alberta.
- A. Skoglund, Assistant Agrostologist, Dominion Range Experimental Station, Manyberries, Alberta.
- O. Freer, Superintendent, Land Utilization, P.F.R.A., Regina, Saskatchewan.
- Dr. F. H. Auld, Deputy Minister of Agriculture, Saskatchewan Government, Regina, Saskatchewan.
- Harold Long, Editor, "Lethbridge Herald," Lethbridge, Alberta.
- A. D. Paul, Soil Specialist, Department of Lands and Mines, Edmonton, Alberta.
- R. Z. Lore, Cattle Rancher, Lathom, Alberta.
- Charles MacKinnon, L. K. Farming and Ranching Company, Dalemead and Lathom.
- Lauchlin MacKinnon, L. K. Farming and Ranching Company, Dalemead and Lathom.
- H. E. Clements, Supervisor of Grazing, Department of Mines and Resources, Saskatchewan.
- Jesse Perrin, Manager, Matador Ranch Community Pasture, Saskatchewan.
- James Crockett, Special Constable, R.C.M.P., Medicine Hat, Alberta.
- James Wilson, Sheep Rancher, Hatton, Saskatchewan.
- George C. Elliott, Dominion Department of Agriculture, Division of Economics, Edmonton, Alberta.
- Jack Byers, Livestock Supervisor, Department of Agriculture, Canada.
- Douglas Hardwick, Cattle Rancher, Armada, Alberta.
- Charles Pickering, Weather Observer, Dominion Meteorological Service, Lethbridge, Alberta.
- W. J. Derrick, United States Forest Service, Billings, Montana.
- C. E. Brackett, United States Forest Service, Billings, Montana.
- E. D. Sandvig, United States Forest Service, Missoula, Montana.
- H. E. Schwahn, United States Forest Service, Denver, Colorado.
- R. V. Ferguson, United States Forest Service, Great Falls, Montana.
- J. Moder, Foreman, Bar-Key Ranch—Roy E. Barkey, Owner, Buffalo, Wyoming.
- R. B. Metcalfe, Cowboy, Bar-Key Ranch, Buffalo, Wyoming.

T. H. Perry, Cashier, Farmers State Bank of Conrad, Conrad, Montana.
H. S. Price, Taylor Grazing Act, Department of the Interior, Cheyenne, Wyoming.
Don Kampfe, Cattle Rancher, Round-up, Montana.
Senator Wm. H. Cross, V. E. Ranch, Douglas, Wyoming.
Tom Weadick, Manager, Prairie Transport and Construction Company, Casper, Wyoming.
C. R. Caltrane, Manager, California Company, Casper, Wyoming.
J. Russell, Engineer, States Lands Department, State of Wyoming.
J. B. Griffiths, State Commissioner of Lands, State of Wyoming.
Russell Thorpe, Secretary and Chief Inspector, Wyoming Stock Growers' Association, Cheyenne, Wyoming.
Howell Harris, Cattle Rancher, Highwood, Montana.
Assistant Supervisor Kennedy, United States Forest Service, Great Falls, Montana.
State Highway Patrolman No. 27, Montana State Highway Patrol, Billings, Montana.
Gordon B. Brown, B.Sc., MacCallum-Hill Bldg., Regina, Saskatchewan.
F. E. Mollin, Secretary, American National Livestock Association, Denver, Colorado.
T. H. Hughes, Manager, Sheridan Wyoming Power Company, Sheridan, Wyoming.
Earl Cooley, Chief Clerk, State Lands Department, State of Colorado, Denver.
Mrs. N. B. Sherlock, Commissioner of Lands, State of Montana, Helena, Montana.
O. S. Longman, Field Crops Commissioner, Province of Alberta.
County Commissioner's Office, County Casper, Wyoming.
George R. Stratton, Assistant Cashier, First National Bank, Great Falls, Montana.
Judith Basin Experiment Station, U.S.D.A., Moccasin, Montana.
W. S. Benson, Secretary, South Alberta Sheep Breeders' Association, Lethbridge, Alberta.
Kenneth Coppock, Secretary, Western Stock Growers' Association, Calgary, Alberta.
B. V. Gee, Department of Municipal Affairs, Edmonton, Alberta.
Station Operators, California Company, States of Montana and Wyoming.
Dale Willey, Manager, Wyndham Co-operative, Wyndham, Montana.
Great Western Sugar Company, Billings, Montana.
W. C. McKenzie, Manager, South Alberta Co-operative Association, Lethbridge, Alberta.
Dr. J. C. Hargrave, Dominion Veterinarian, Dominion Department of Agriculture, Calgary, Alberta.
D. C. McKenzie, Markets Division, Dominion Department of Agriculture, Calgary, Alberta.
J. Howard Kelly, Secretary, P. Burns Ranches Limited, Calgary, Alberta.
F. G. Freeborn, Production Service, Dominion Markets Branch, Department of Agriculture, Calgary, Alberta.
C. Rogers, Hudson's Bay Company, Land Department, Medicine Hat, Alberta.
Dr. W. H. Fairfield, Superintendent, Experimental Farm, Dominion Department of Agriculture, Lethbridge, Alberta.
A. E. Palmer, Assistant Superintendent, Dominion Experimental Farm, Lethbridge, Alberta.
Lt. Commander C. H. Bromley, R.N. Reserve, Weather Observer, Dominion Meteorological Service, Calgary Airport, Calgary, Alberta.
J. Marcelle, Assistant Observer, Medicine Hat Airport, Medicine Hat, Alberta.
George C. Millar, Sheep Rancher, Taber, Alberta.
George Murray, Cattle Rancher, Seven Persons and Ronolane, Alberta.
W. C. McKenzie, Manager, South Alberta Co-operative Association Limited, Lethbridge, Alberta.

Ralph Thrall, Secretary, McIntyre Ranches Limited, Magrath and Lethbridge, Alberta.
 Sher. Willows, Canada Packers Limited, Calgary, Alberta.
 H. G. Minor, Cattle Rancher, Medicine Hat, Alberta.
 George G. Ross, Cattle Rancher, President, Short Grass Stock Growers' Association, Aden, Alberta.
 J. J. Bowlen, M.L.A., Sheep Rancher, Alderson, Alberta.
 Albin Nelson, Horse Rancher, Brooks, Alberta.
 Eide Brothers, Ranchers, Brooks, Alberta.
 Mack Higdon, Higdon Ranching Company, Comrey, Alberta.
 T. Hargrave, Hargrave Ranching Company, Walsh, Alberta.
 F. Perrier, Cattle Rancher, Walsh, Alberta.
 Perle Jones, Sheep Rancher, Aden, Alberta.
 P. A. Minor, Sheep Rancher, Short Grass Stock Growers' Special Committee, Alderson, Alberta.
 R. F. Gilchrist, Manager, Gilchrist Brothers Limited, cattle and sheep ranchers, member Short Grass Association Special Committee, Wild Horse, Alberta.
 Joe Gilchrist, Gilchrist Brothers Limited, St. Kilda, Alberta.
 J. B. Simpson, Cattle Rancher, Wild Horse, Alberta.
 Percy W. Stimson, Cattle Rancher, Ranchville, Alberta.
 F. Zink, Horse Rancher, Alderson, Alberta.
 W. R. McFall, Cattle Rancher, Etzikom, Alberta.
 Magnus Bjork (deceased), Cattle Rancher, Atlee, Alberta.
 Clinton Jarbo, Sheep Rancher, Bindloss, Alberta.
 F. E. Dixon, Cattle Rancher, Groton, Alberta.
 George Griffiths, Cattle Rancher, Govenlock, Saskatchewan.
 William C. Heydlauff, Cattle Rancher, Wild Horse, Alberta.
 Harold B. Moon, Sheep Rancher, Buffalo, Alberta.
 T. McConnel, Sheep Rancher, Monitor, Alberta.
 F. W. Beynon, Cattle Rancher, Esther, Alberta.
 Frank L. Moorehouse, Cattle Rancher (retired), Calgary, Alberta.
 Major H. G. L. Strange, Director, Research Division, Searle Grain Company Limited, Winnipeg, Manitoba.
 D. W. Hayes, General Manager, Canada Land and Irrigation Company Limited, Medicine Hat, Alberta.
 E. G. MacDonald, Canada Land and Irrigation Company Limited, Medicine Hat, Alberta.
 C. T. Schon, Accountant, Eastern Irrigation District, Brooks, Alberta.
 H. C. Schammel, Tax Branch, Eastern Irrigation District, Brooks, Alberta.

PERSONS SUBMITTING WRITTEN DATA IN CONNECTION WITH THIS REPORT

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 Dean A. M. Shaw, Director of Marketing Service, Dominion Department of Agriculture, Ottawa, Ontario.
 Dr. J. F. Booth, Associate Director Marketing Service, Division of Economics, Dominion Department of Agriculture, Ottawa, Ontario.
 F. E. Mollin, Secretary, American National Livestock Association, Denver, Colorado.
 F. Albert Rudd, B.A., L.L.D., Thesis, "Production and Marketing of Beef Cattle, From the Short Grass Plains Area of Canada," Lethbridge, Alberta.
 L. B. Thomson, B.Sc., Superintendent, Dominion Experimental Farm, Swift Current, Saskatchewan.
 H. J. Hargrave, B.Sc., Superintendent, Dominion Range Experiment Station, Manyberries, Alberta.
 Charles Peak, Cattle Rancher, Dorothy, Alberta.
 Dr. L. C. Hurtt, United States Forest Service, Missoula, Montana.

Deputy Minister of Municipal Affairs, Province of Saskatchewan, Regina, Saskatchewan.

Mrs. N. B. Sherlock, State Commissioner of Lands, State of Montana, Helena, Montana, U.S.A.

W. B. Mitchell, Director, Highland Hereford Association, Marfa, Texas, U.S.A.

Olaf Olafson, Vice-president, Saskatchewan Stock Growers' Association, Old Wives, Saskatchewan.

Commissioner of Lands, Province of British Columbia, Victoria, British Columbia.

J. B. Griffiths, Commissioner of State Lands, State of Wyoming, Cheyenne, Wyoming.

Bascom Giles, Commissioner of General Land Office, State of Texas, Austin, Texas.

Mrs. J. M. Keith, Secretary, Arizona Cattle Growers' Association, Phoenix, Arizona (140 South Central Avenue).

B. F. Davis, Secretary, Colorado Stock Growers' and Feeders' Association, 1641 Stout Street, Denver, Colorado.

E. A. Phillips, Secretary, Montana Stock Growers' Association, Helena, Montana.

Russell Thorp, Secretary, Chief Inspector, Wyoming Stock Growers' Association, 1816 Carey Avenue, Cheyenne, Wyoming.

O. H. Snow, Secretary-Treasurer, Raymond Board of Trade, Raymond, Alberta.

Department of Municipal Affairs, Province of Alberta, Edmonton, Alberta.

W. C. McKenzie, Manager, Southern Alberta Co-operative Association Limited, Lethbridge, Alberta.

Marketing Service, Dominion Department of Agriculture, Ottawa, Ontario.

Superintendent, Blackfeet Indian Reservation, Indian Service, United States Department of the Interior, Browning, Montana.

Professor J. Mitchell, Professor of Soils, University of Saskatchewan, Saskatoon, Saskatchewan.

O. Freer, Supervisor of Land Utilization, Prairie Farm Rehabilitation Act, Regina, Saskatchewan.

H. E. Clements, Supervisor of Grazing, Department of Natural Resources, Province of Saskatchewan, Regina, Saskatchewan.

BIBLIOGRAPHY

- Allan, J. A.:
 "Appendix II," Soil Survey—Macleod, Medicine Hat and Sounding Creek Sheets—University of Alberta, College of Agriculture. Bulletins 11, 14 and 16.
- Allen, W.:
 "The Farm Business in Saskatchewan," University of Saskatchewan. Bulletin 37, January, 1927.
- Anderson, C. G.:
 "Scientific Range Management," graduate thesis—University of Saskatchewan; "Drought and Range Scrap Book," Ayre, Robert; "Missing Moisture," MacLean's Magazine, November 15th, 1934; "Contour Work," Soil Conservation Service, U.S.D.A., Dalhart Station, Dalhart, Texas; W. E. Mitchell, letter.
- Arkel, H. S.:
 Address, "Argentine Livestock Industry," Western Stock Growers' Association, Calgary, 1938.
- Brown, G. B.:
 Observations. Travels, United States, Argentine, Manchuria, Siberia and Western Russia.

Byers, Jack:

Address, "Compulsory Beef Grading Act, British Columbia"—Western Stock Growers' Convention, Calgary, 1940.

Calgary Herald:

Files, Calgary Daily Herald and Calgary Herald, 1910 and 1940.

Chittenden, D. W., Saunderson, M. H.:

"Cattle Ranching in Montana," an analysis of operating methods, costs and returns in western, central and eastern areas of the State—Bulletin 341—Montana State College, Bozeman, Montana.

Clawson, Marion:

Range Costs, Montana, U.S.D.A.

Country Gentleman:

Issue, July 1923, "The Buffalo Taught Us." Scrap-book, C. G. Anderson.

Dominion Bureau of Statistics:

Map, "Rainfall on the Prairies."

Dominion Range Experimental Station:

Files, range industry other countries; "Results of Experiments, 1927-1936, Inclusive," L. B. Thomson.

Dominion Range Experiment Farm, Lethbridge:

Weather files, 1939-1940.

Ely, Richard T.:

Lectures on Land Economics, University of Wisconsin, Madison, Wisconsin, U.S.A.

Gilchrist, R. P.:

"Grass as a Resource," Canadian Cattleman, March, 1940.

Hill, Robert T.:

"The Public Domain and Democracy."

Hough, Donald:

"Beef Comes From the Hills," Saturday Evening Post, October 21st, 1939.

Hurt, L. C.:

"Overgrazing Increases Productive Costs by Reducing Number and Weight of Range Calves," Bulletin—U.S. Forest Service, Missoula, Montana.

Jardine, J. T., Hurt, L. C.:

"Increased Cattle Production on South Western Ranges," U.S.D.A. Bulletin No. 588.

Judith Basin Experiment Station, U.S.D.A.:

Experimental files, Moccasin, Montana.

Kindt, L. E.:

"Economic Survey Range Sheep Industry Western Canada," Dominion Department of Agriculture.

Lake Shore Mines Ltd., Kirkland Lake, Ontario:

Advertisement, "Progress of Gold Mining," Toronto Saturday Night, March, 1940.

Land Laws:

Australia, New Zealand, South Africa, Argentine, United States of America, States of Arizona, New Mexico, Colorado, Texas, Montana, Wyoming, the Provinces of Alberta, Saskatchewan and British Columbia, Canada.

- Lusk, Robert D.:
"Sorghums Settle the Dust," Country Gentleman, May, 1940.
- Long, Harold G.:
"Lethbridge Herald," Jubilee Edition, 1935.
- Marketing Service:
Dominion Department of Agriculture, Livestock Market Letter, Market Review, 1939.
- Meteorological Service, Canada:
Maps Western Canada; records, Calgary, Lethbridge and Medicine Hat airports.
- Mitchell, J.:
Map soil survey, Province of Saskatchewan.
- Mitchell, W. B.:
"The Foundation of the Highland Hereford Association," Marfa, Texas; correspondence with Appraiser, 1923.
- Montana State:
Grass Conservation Commission Act.
- Nordyke, Lewis T.:
"The Highland Herd," Country Gentleman, April, 1940.
- Parr, V. V., et al.:
"Ranch Organization and Methods of Livestock Production in the South West"; technical bulletin No. 68, U.S.D.A.
- Poole, James E.:
"Nature Helps Feeder but Hits Grower." American Cattle Producer, Denver, November, 1939.
- Proskie, John:
"Trends in Security of Tenure of Grazing Lands, Western Canada," Dominion Department of Agriculture. Canadian Cattleman, June, 1939.
- Rudd, F. Albert:
"Production and Marketing of Beef Cattle from the Short Grass Plains Area of Canada," graduate thesis, University of Alberta.
- Saunderson, M. H.:
"Systematic Records Aid in Management," American Cattle Producer, Denver, November, 1939.
"Land Costs and Investment Standards," American Cattle Producer, Denver, December, 1939.
- Shaw, A. M.:
"Drought on the Canadian Prairies." Address, Regina Board of Trade, Regina, Saskatchewan, 1934.
- Stuart, Maj. Duncan:
"The Canadian Desert," 1934.
- Smith, Adam:
"Wealth of Nations," Book V, Chapter 2.
- South Alberta Co-operative Association:
Sales records, Community Auction Sales Association, 1939.
- Taylor Grazing Act:
United States of America—Congress and Senate.
- Terret, Julian:
United States Department of the Interior, Montana Stockmen's Journal, March, 1940.

- Tisdale, E. W.:
"Our Native Pasture Plants," Dominion Department of Agriculture.
University of Wyoming:
"Types of Farming and Ranching Areas in Wyoming," Bulletin
No. 228.
- Vass, Dr.:
Bulletin No. 229, University of Wyoming.
- Warren, E.:
Address, "Cow Country." Official Bulletin, Wyoming Stock Grow-
ers' Association, Cheyenne, Wyoming, November, 1939.
- Wilson, et al.:
Technical Bulletin, U.S.D.A., March, 1928.
- Wooton, E. O.:
"Tenure and Use of Arid Grazing Lands," U.S.D.A., No. 1001.
- Wyatt and Newton:
Soil Surveys, Bulletins 11, 14 and 16, University of Alberta.
- Youngblood, B.:
"An Economic Study of a Typical Ranching Area on the Edwards
Plateau of Texas." Texas Experiment Station, Brazos County, Texas
Bulletin, No. 297.

APPENDICES

References are made throughout this Report to certain appendices, which it was intended should appear at the end of this work. On completion of same, however, they were found to be too voluminous to make their inclusion possible. A supplement to this Report, in which they would be published, is under consideration.

